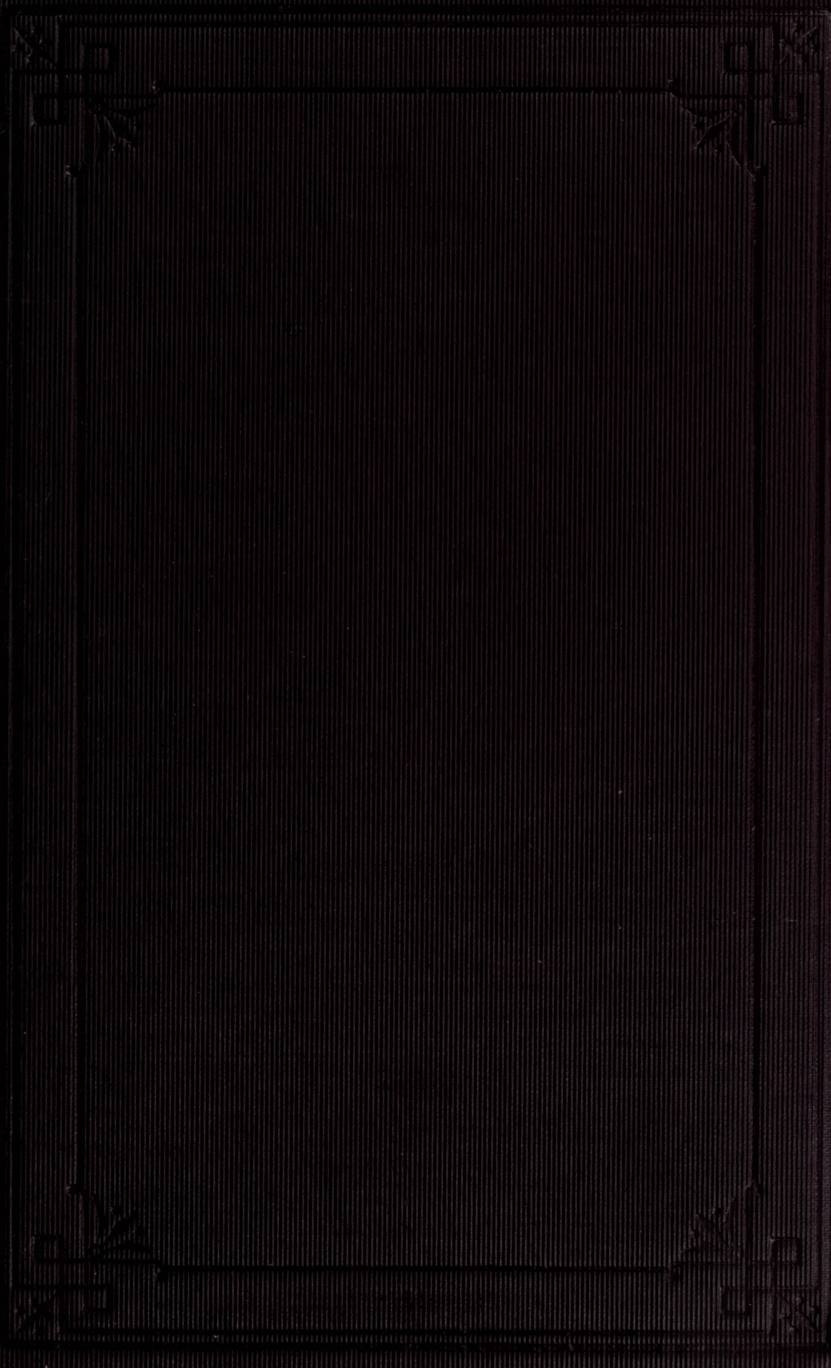

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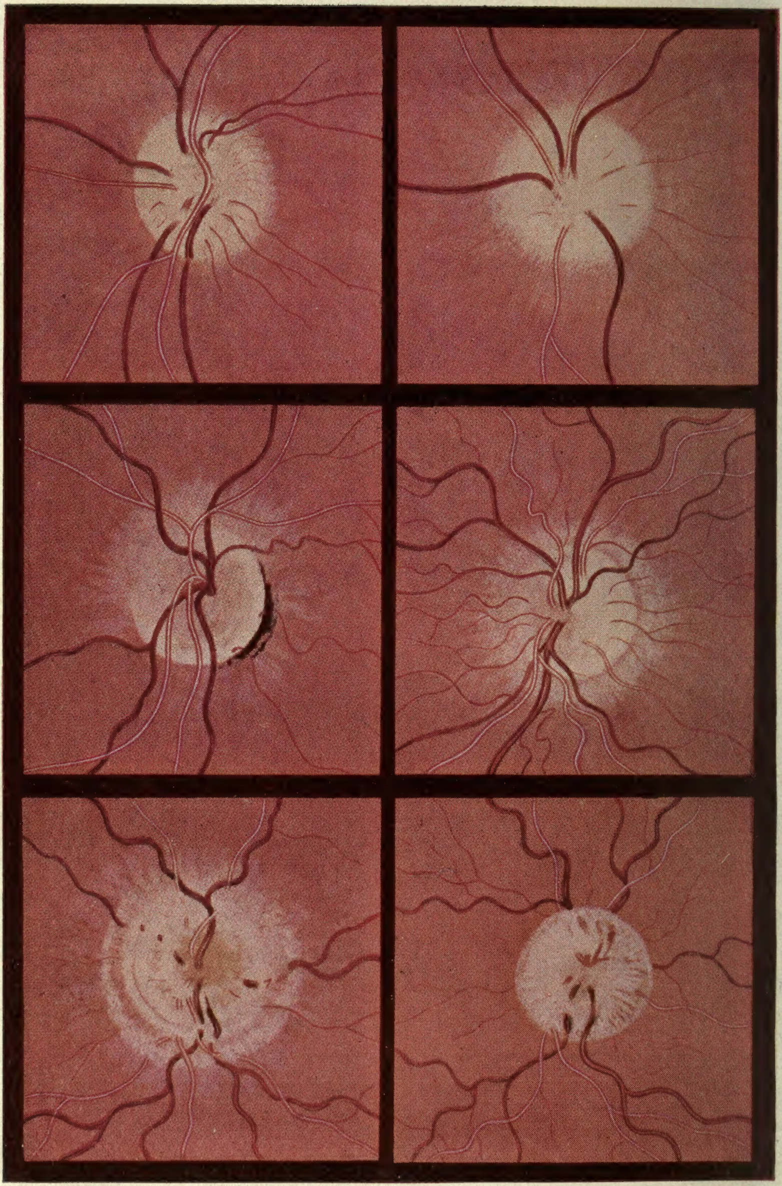

Neuro-retinitis syphilitica et papilledema. 1. Early stage. 2. Medium, with edema. 3. Medium. 4. Advanced. 5. Intense. 6. Choked disk.—Würdemann (*American Journal of Ophthalmology*).

The

Practical Medicine Series

COMPRISING EIGHT VOLUMES ON THE
YEAR'S PROGRESS IN MEDICINE AND SURGERY

Under the General Editorial Charge of

CHARLES L. MIX, A. M., M. D.

Professor of Physical Diagnosis in the Northwestern
University Medical School

Volume III

The Eye, Ear, Nose and Throat

EDITED BY

CASEY A. WOOD, C.M., M.D., D.C.L.
ALBERT H. ANDREWS, M.D.
GEORGE E. SHAMBAUGH, M.D.

SERIES 1920

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DEPARTMENTS

The Eye

CASEY A. WOOD, C.M., M.D., D.C.L.

Colonel, M.R.C., U. S. Army
Emeritus Professor of Ophthalmology, College of Medicine, University of Illinois;
Consulting Ophthalmologist, Cook County Hospital; Consulting
Ophthalmic Surgeon, St. Luke's Hospital, Chicago

The Ear

ALBERT H. ANDREWS, M.D.

Professor of Otology, Rhinology and Laryngology in the Chicago Policlinic;
Oculist and Aurist to the Chicago, Rock Island
& Pacific Railway, etc.

The Nose and Throat

GEORGE E. SHAMBAUGH, M.D.

Professor of Otology, Rhinology and Laryngology, Rush Medical College;
Otologist of the Presbyterian Hospital

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PREFACE.

Although the output of ophthalmic literature during 1919 was not quite equal to the annual contributions of the prewar period, yet, including the articles and books on military surgery, it was much more than this necessarily restricted volume is able to review. The subjects supposed to be exclusively or largely military are, after all, mostly civilian in their practical applications, so that although a chapter has been devoted to military ophthalmology many papers written as the result of experiences gained in camp and trench will be found under the ordinary headings. In addition to these subjects especial attention has been given to general diseases in their relation to ocular affections.

The Editor acknowledges his indebtedness to the *Journal of the American Medical Association*, the *British Journal of Ophthalmology, Ophthalmic Literature* and especially to the contributors to and collaborators of the *American Journal of Ophthalmology*, from which he has extensively quoted. CASEY A. WOOD.

DISEASES OF THE EYE.

PREFATORY NOTE.

The Medical and Surgical History of American Participation in the World War. Since several prominent ophthalmologists (notably Col. George E. de Schweinitz) are contributors to it and as the Editor once had temporary charge of the undertaking for the Surgeon-General, it may not be out of place here to refer to this important task. The *Journal of the American Medical Association*[1] reports that the Surgeon-General, with the approval of the Secretary of War, is asking for an appropriation, in the Sundry Civil Bill, for the publication of the medical and surgical history of the World War. In its projected form, this medical history will be more than an account of the rapid expansion and administrative achievements of the medical department; it will be a collective study of the many problems of hygiene, medicine and surgery which were involved in the efficient medical care of the nation's armies—in fact, a system of medicine and surgery based on the experience and observations of the physicians who guarded the health of our soldiers. The knowledge which was gained in hospitals and on the battlefield, and the vast amount of medical research carried on during the war, can be made of immediate value to the medical profession and the public only by prompt publication of the medical history. There can be no question of the merit of such a work; as a scientific record alone, the data will be of permanent value, irrespective of considerations regarding their utility as a source of information in future emergencies. The first volume of an unofficial history of the Canadian army medical corps appeared last year, steady progress has been made on the official

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(1) Editorial, Jour. Amer. Med. Ass'n., April 3, 1920.

British medical history, and the history of German participation in the war will be issued in nine volumes late in 1920; much of the material for the American history is already collected, and publication waits on the action of Congress. Nothing can be gained from procrastination and delay—the appropriation requested by the Surgeon-General should be allowed promptly. The medical and surgical history of the War of the Rebellion was delayed through twenty years. It is to be hoped that a similar fate does not await the publication of the Medical History of the World War. If Congress does not, within a short time, make the appropriation necessary for the printing of this available material, the failure will be tantamount to an order for its destruction. In a few years this material would be of archaic, but not of scientific, interest.

[Since the foregoing was written, the Government, at the request of the Surgeon-General, has appropriated $50,000 for the publication of this history. This sum is immediately available and, doubtless, will be supplemented by further subventions, so that a complete account of our medicomilitary activities may be adequately recorded.—Ed.]

EXAMINATION OF THE EYE.

Fundus Appearances with the Red-Free Light of Vogt. An interesting paper on this subject is by Robert von der Heydt.[2]

He claims that in the normal fundus the red-free light gives the first absolute demonstration of the yellow coloring at the macula in the living eye. Owing to an increased contrast new details of the macula and fovea can be seen.

With it we can also measure by comparison the yellow discoloration of the lens in age and in monolateral aphakia. In addition, the increased visibility of the retinal nerve fibers with the red-free light is of great importance. In a recent article Vogt draws attention to the fact that optic atrophy with our present method of examination is only diagnosable at the nerve-head and from the vessel caliber of the same. The retina,

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(2) Amer. Jour. Ophthal., May, 1919.

however, though it no doubt is regularly involved in the atrophic process, shows no ophthalmoscopic changes. With the red-free light the nerve striations of the retina can be seen and their pathologic changes studied.

In optic neuritis and retinitis the nerve fibers are coarser, single bundles intermingle, while elsewhere they are interrupted and seem to recede in step-like layers.

Aside from these inflammatory changes he finds certain modifications of the nerve fiber striations in optic atrophy. In complete post-neuritic, as well as in primary and glaucomatous atrophy, also in that complicating retinitis pigmentosa and fracture of the base of the skull, there is found a white, marble-like mottling of the surface.

Most interesting and instructive are the cases in which one optic nerve is normal and the other atrophic.

A case of this type, following fracture of the base of the skull, five years ago, in a man, now 45 years old, is described.

With the ordinary illumination there are no changes except those of atrophy at the nerve-head and its vessels. The red-free light, however, proves total absence of the retinal striations in the atrophic eye. In their place there is a delicately mottled, marbleized surface; also, a thin, whitish line on either side of the vessels, invisible with ordinary illumination. In a case of partial post-neuritic atrophy complicating multiple sclerosis there was a reduction in the visibility of the nerve fibre striae, and in certain zones they were absent. This disappearance of retinal striations must be added to the symptomatology of optic atrophy, and must be conceded to be the only known visible ophthalmoscopic sign of retinal atrophy, if we exclude the more or less indefinite picture of shrinking of the vessel caliber.

Of especial practical importance are further detailed observations made with the red-free light in retrobulbar neuritis. In the diagnosis of this common and often obscure eye disease, we must at times depend on such subjective symptoms as the statement of the patient as to his habits, nyctalopia, central scotoma, etc.

Several authors have drawn attention to degenerative changes in the retinal vessels which accompany this disease. These, however, are not always present and are often difficult of diagnosis. If present they are not necessarily pathognomonic of retrobulbar neuritis. The latter is also true of the so-called temporal pallor of the disc, which is often found in normal fundi.

The fact that we have in red-free illumination a method of diagnosing degenerative changes of the maculopapillary bundle in retrobulbar neuritis is of great practical importance.

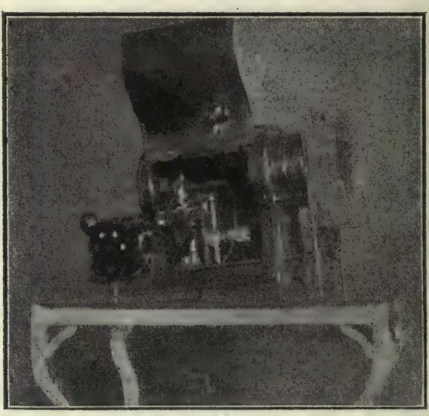

Fig. 1. Lamp with filtration apparatus, after Vogt and Affolter.

The changes found with great regularity are absence of striation and a substitution therefor of the marbleized zone in the papillomacular bundle.

Vogt has observed similar changes and degenerations in this same retinal zone in cases of ascending atrophy of this central nerve tract in isolated disease, and degeneration of the macular and foveal zone.

Recent anatomic investigations have proved that the macular zone is practically absent in the eyes of albinos. The investigations of Vogt and Affolter seem to confirm this as they fail to find the yellow coloration at the macula in the eyes of living albinos. This leads to the conclusion that the absence of the yellow coloring matter deposited in the macula is in direct or indirect relation to the lack of pigment in general.

In the past few months von der Heydt has studied many fundi with the red-free light (Fig. 1). The yellow coloration of the macula is most beautiful. He notes a greatly increased visibility of the foveolar reflex of Dimmer. It shows as a luminous spot, much more glistening, for instance, than any so-called cholesterin crystals he has ever seen.

Vogt describes pathologic honeycomb-like changes of the macula, visible only in the red-free light. They were found especially in cases of retinitis pigmentosa, and continued during certain long periods. A year later, in one case, he found them less marked. In other very advanced cases they were absent. He also has noted this vacuoli formation, for a period of several months, in cases of injury to the macula following contusion of the bulb. Later, they gradually disappeared. He considers them symptoms of vascular and cystic degeneration of the macula (Fig. 2).

Leber has described similar vacuoles of the macula anatomically and presumes that the bursting of some of their thin anterior walls could produce, in time, the condition we know of as "hole in the macula."

Vogt gives a description of vacuoles of this kind in a case of embolism of the central retinal vein. Two large, nearly circular, spaces in the center of the macula showed a hyphema in their lower thirds. After a few days these two became confluent. Quite a number of other smaller vacuoles, partly containing blood, were visible and remained so for months. If the patient

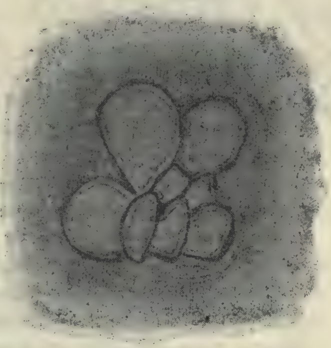

Fig. 2. Honeycomb appearance of macula.

were to be examined lying on one or the other side, this precipitate would slide or gravitate to the altered position. On the patient's resumption of the upright attitude they would return to their original site in about two minutes (Fig. 3).

Following this experiment a distinct clouding of the clear contents of the cyst above the hyphema was repeatedly noted and continued for a short period, due to a whirling or stirring up of the pigment disturbed in its complete precipitation.

These observations prove that cystic degeneration of the macula can produce the condition we call "hole in the macula," and account for the great length of time so often consumed in gradually bringing about this interesting pathologic condition.

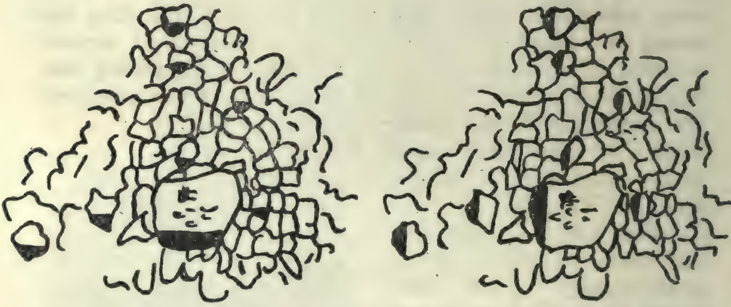

Fig. 3. Effect of change of posture showing gravitation of hyphemae.

Many new reflexes in various parts of the retina and true folds not due to separation or detachment are fully described by Vogt in several recent articles. Affolter also emphasizes the greater visibility of delicate vitreous opacities, deposits on the lens and vascularization of the cornea, with the red-free light.

It is not expected that this method will supersede the ordinary light for ophthalmoscopy. Certain conditions, such as exudative zones, the changes in retinitis proliferans, medullated nerve fibers, and the star figuration of retinitis, for instance, are seen in better contrast with our old light. There is no doubt, however, that with the red-free light, we have added a most valuable and helpful method of diagnosis.

Test Objects for Illiterates. A complete study with corresponding illustrations is published by A. E. Ewing.[3] The writer tells us that, arranged chronologically, the various steps in the development of the illiterate tests are:

(1) 300 B. C.—Determination of the visual limit by Euclid.

(2) 1623 A. D.—Practical determination of vision by means of mustard seed and by use of print in the prayer book, by Daca de Valdes.

(3) 1674.—The one minute visual angle established by Hooke.

(4) 1835-36.—Gradation of type, selection of light, selection of paper, and arrangement of pictures for testing the vision by Küchler.

(5) 1854.—Use of lines and spaces in logarithmic progression (= geometric progression) for determining visual acuity by Edward Jaeger (Fig. 4).

(6) 1860.—Employment of dots for testing the vision, by Longmore and Streidinger.

(7) 1866.—Employment of geometric forms of practically equal size by Snellen.

(8) 1870.—The introduction of one minute squares and one and three minute rectangles by Boettcher.

(9) 1873 to 1915.—Introduction of several so-called one minute tests in white, none of them central. Snellen 1873, Landolt 1888, Jackson 1891, Pergens 1893, von Ammon 1901, Pergens 1909, McKinney 1915, Wolffberg 1915. Of these that of Landolt was selected as the standard visual test object by the International Ophthalmic Congress in 1909 (Figs. 5 to 8).

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(3) Amer. Jour. Ophthal., January, 1920.

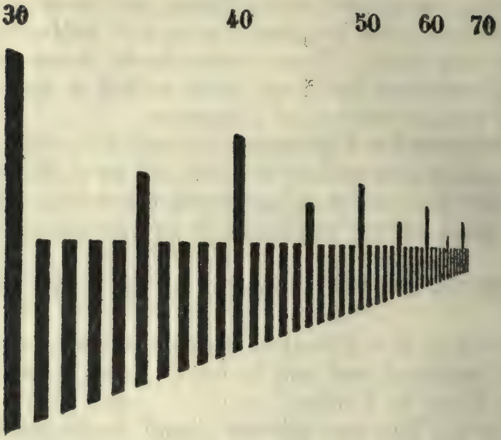

Fig. 4. The second recorded visual test for illiterates. Devised by Eduard Jaeger, 1854.

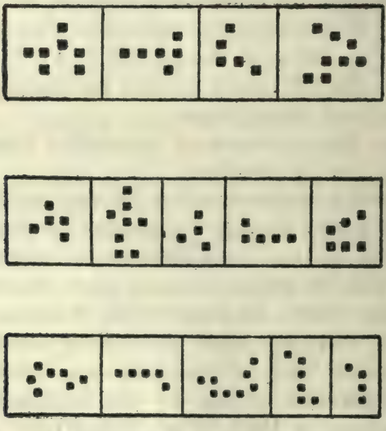

Fig. 5. The illiterate near test of Albrand, 1894.

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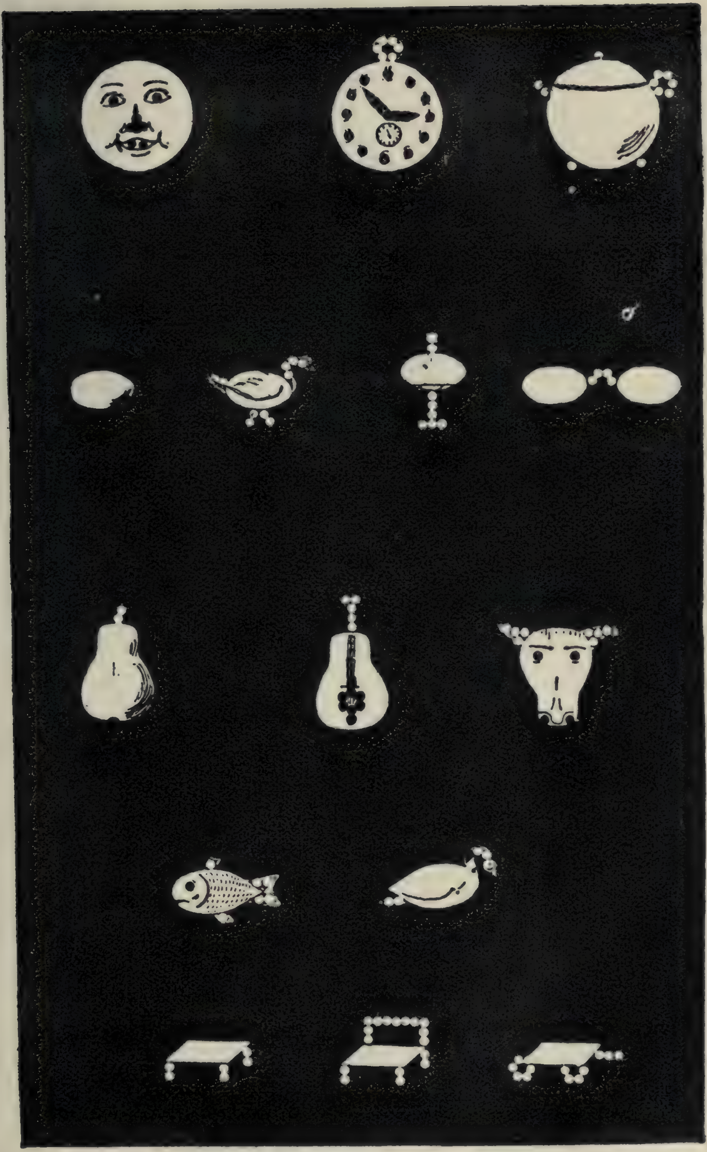

The illiterate tests of Wolffberg, 1911, on a black background.—Ewing, page 15.

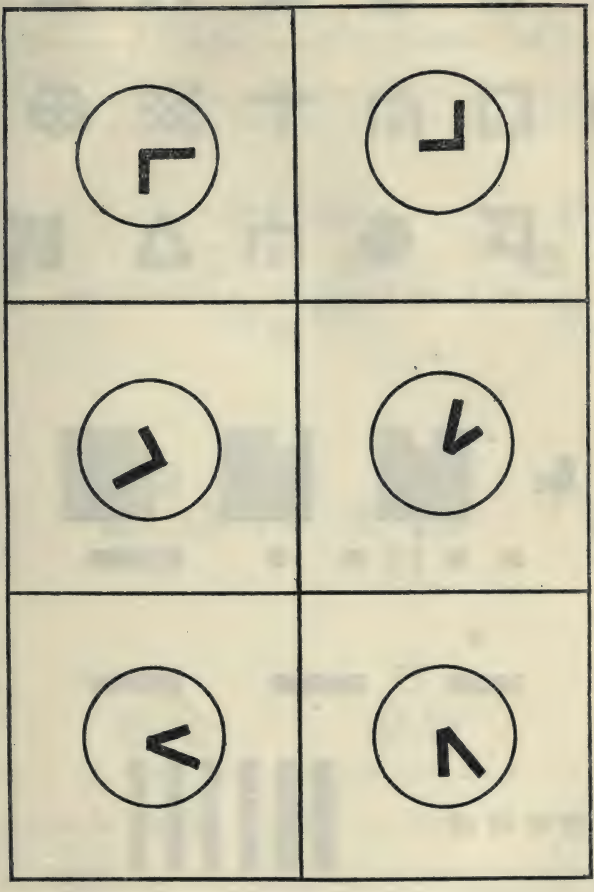

Fig. 6. The illiterate test of Praun, 1900.

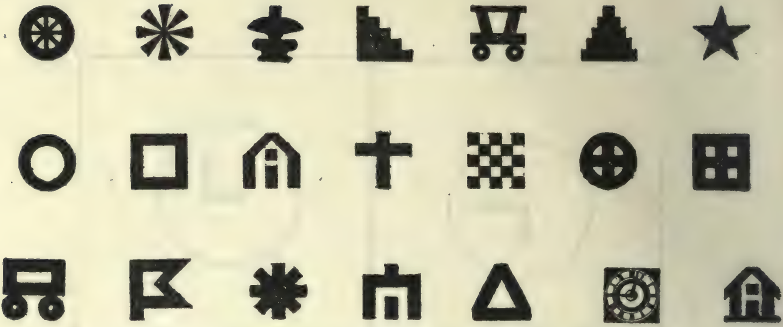

Fig. 7. The illiterate tests of Thorington, 1908.

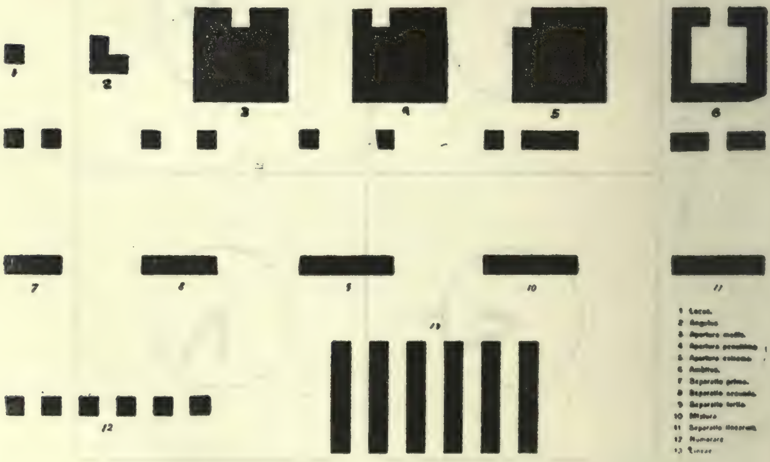

Fig. 8. The "Primary" tests of Pergens, 1909.

(10) 1910-1916.—Introduction of two central one-minute tests in white, Wolffberg 1910, Ewing 1916 (Plate II and Fig. 9).

(11) 1918.—Standardization of illiterate test objects by the Section of Ophthalmology of the American Medical Association.

[The reference to Daca de Valdes recalls the fact that it was he who published (in 1623) the first scientific work on spectacles entitled *"Uso de los Antoios"*; Seville, Spain.

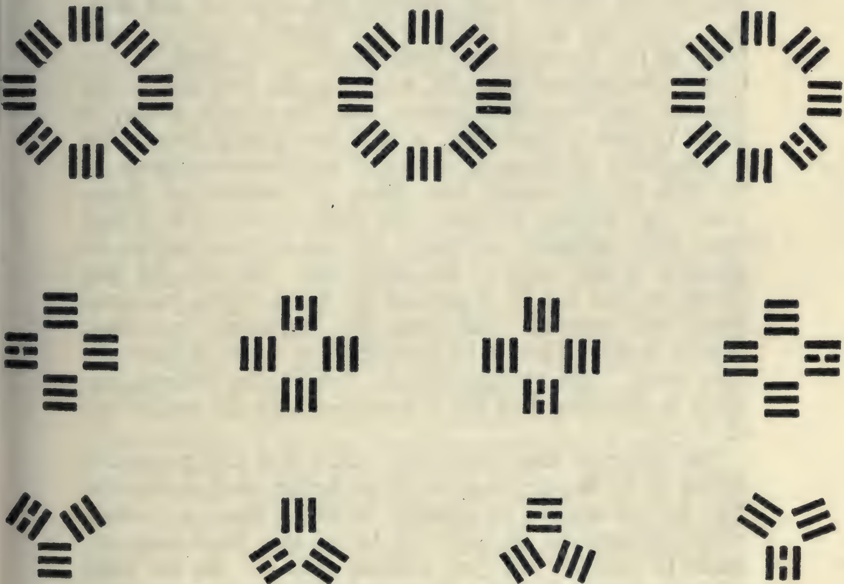

Fig. 9. The uniform central broken-line test of Ewing, 1916.

The Editor has translated and abstracted this little work (with a number of illustrations) for the next number of the *Annals of Medical History*, to which the reader is referred for an interesting account of certain aspects of early seventeenth century ophthalmology.—Ed.]

Test Types for the Illiterate. A committee, the members of which comprised Edward Jackson, N. M. Black,

W. B. Lancaster, and A. E. Ewing, has presented its report upon the standardization of test types for the illiterate to the Section of Ophthalmology of the American Medical Association.[4]

Over 180 different figures were examined, and certain ones were selected, namely, the ring, square, star, pitcher, cross, horseshoe, flag, fork, and chair. The choice was based on the following principles: (1) the lines of which the chief framework of the character is constructed should each subtend the angle of one minute. (2) The main body of the character should conform to the five-minute visual angle. (3) Slight unobtrusive variations may be made in the lengths of the lines of the characters beyond the five-minute angle, in order to insure legibility, as it is practically impossible to construct pictures of ordinary well-known objects in the five-minute space with lines of one-minute thickness. (4) Masses of black are undesirable. (5) Finer lines than subtend the angle of one minute are to be avoided in the body of the character. (6) As any one character can not be depended on for a visual measurement, the smaller characters for distances less than twenty meters should be arranged in rows of three or four each. The reading of the row at the correct distance is considered by the committee to be the equivalent of V.=1.

The interval may be in any ratio, but the geometric ratios of Green are suggested as being most advisable. The figures should be printed in black upon a creamy white background on paper or board of a thickness adequate to prevent the type sinking into it. As the committee points out, there is a distinct advantage in having a relatively small number of characters repeated on successive lines of the chart, for in that way it can be known from the larger lines whether the person tested understands and responds properly to the test. The characters selected by the committee conform so well to the letter tests that the two may be readily interchanged. In addition to the characters now recommended by the committee, several "one-minute" tests have been considered, such as the Snellen "E," the Landolt "Broken Ring," the Jackson "Incomplete Square," and the "Incomplete Parallelogram" forms of Pergens, besides the several varying one to three minute tests of Pergens, the "Crosspoint" and "Line-point" tests of Wolffberg, and the Central Broken Line test of Ewing. Taken singly each of the tests last named is practically the equivalent of the others. They are excellent when any question of a fine degree of visual acuity is involved, as well as for the repeated testing of those with greatly reduced vision. The difficulty concerns the amount of time consumed by their employment. For obtaining some idea of the vision of very young children the committee endorses the suggestion of Worth, namely, that balls of various sizes be employed. But in place of the ivory used by Worth, some noiseless material, such as paper, yarn, cork, or rubber, painted white or black to contrast with the background, would be preferable.

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(4) Editorial, Brit. Jour. Ophthal., June, 1919.

[While it is quite evident that the illiterate test object should be of the simplest kind and should conform to the well-known rules of physiologic optics governing these tests, the experience of every ophthalmologist will confirm the statement that the personality of the examiner and the tact and judgment he exhibits in making the investigation are more important considerations than the variety of type or object chosen for the purpose. A quiet and kindly manner will elicit from a child or stupid adult more subjective information as to vision and refraction than a wall covered with charts manipulated by a person of rude and brusque demeanor.—Ed.]

The Oculocardiac Reflex. It is affirmed by L. Binet[5] that pressure on the eyeball modifies not only the heart action but also respiratory and motor functioning, so that in addition to the oculocardiac there are oculorespiratory and oculomotor reactions. Binet suggests that this test might be useful in examination of the heart. With an extracardiac murmur there is generally tachycardia. On compression of the eyeball the heart beat drops from 100 to 60 or 40, and the murmurs disappear, while an organic murmur becomes stronger and more

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(5) Presse méd., Aug. 21, 1919.

distinct on compression of the eye. Compression of the eyeball may arrest a spasm of paroxysmal tachycardia. The vasoconstrictor action is evident even in the brain; headache after trephining is temporarily relieved. It may likewise arrest for thirty seconds or so respiration in inspiration, or it may slow the respiration, reducing the rhythm but increasing the amplitude. This explains its favorable action on asthma and on hiccup. The inhibiting effect on hiccup is particularly marked.

The oculomotor reflex is particularly pronounced in the shaking with a chill, as compression of the eyeball arrests the muscular contractions. In the original article Binet reproduces the tracings from a case of exophthalmic goiter showing the marked effect on the tremor of compression of the eyeballs. The tremor almost stopped, and did not resume its original amplitude for some time. In a case of athetosis the inhibiting influence of compression of the eyeballs was marked.

Argyll Robertson Pupil. A number of papers and reports[6] on this phenomenon have appeared during the past year. For example, Bollack cites a case illustrating the Argyll Robertson pupil following an injury to the eye. There was complete paralytic mydriasis and paralysis of accommodation following the injury. Two months later there was contraction of the pupil, no response to light stimulus, but response to convergence. Atropine caused maximum dilation. Two months after that there was a slight response to light. He cautions against concluding that the Argyll Robertson pupil always indicates a central nervous lesion.

A case of unilateral Argyll Robertson pupil is also reported by Lutz who states that only five cases of unilateral immobility to light, with conservation of consensual reaction in both eyes, have been reported. He discusses the Argyll Robertson pupil in the light of our present knowledge and states that these unilateral cases are mostly precursers of general paralysis and emphasizes the importance of a careful examination of the light reflex in every case of anisocoria. He also discusses the different theories which tend to fix precisely the situation

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(6) Ophthalmic Literature, 1919 and 1920.

of the anatomic lesion and believes that, to explain the Argyll Robertson phenomenon, we must not look for the lesion in the spinal cord, nor in the ciliary ganglion, but in the region of the photomotor center.

Dunn disagrees with Lutz as to the location of the lesion, believing that it can be situated nowhere else than in the ciliary ganglion and can be caused only by microorganisms or their products which shut off, in the ciliary ganglion, the sensoromotor and sensorosympathetic connections. He reports cases to accentuate the fact that the primary pupillary response to light is an autonomic reflex, and as such belongs to the vegetative system, and further is mediated through the ciliary ganglion; to call attention to what constitutes the true Argyll Robertson phenomenon; and to explain how and why the array of symptoms constituting the uncomplicated Argyll Robertson syndrome vary from case to case and in the same case at different stages of its history. Dunn also states that when the pupils do not respond to light, either directly or consensually, and do respond in convergence, it does not necessarily make the case one of Argyll Robertson pupil. The true Argyll Robertson pupil, free from complications and before degenerative changes affecting either the retina or the motor fibers in the ciliary ganglion set in, gives the above syndrome plus the fact that the pupils are contracted.

HYGIENE OF THE EYE.

Welfare of the Blind.[7] The British Department Committee on the Welfare of the Blind, which reported in July, 1917, recommended the establishment in the Local Government Board of a special department whose functions should be the general care and supervision of the blind and the appointment of an advisory committee of persons associated with the care of the blind. Its first report (for the period ended March 31, 1919) has been published by the ministry of health. A register formed on the replies thereto shows a total of 25,840 blind persons in England and Wales. Inquiry was made

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(7) London Letter, Jour. Amer. Med. Ass'n., Dec. 6, 1919.

into the work of the blind, and it was found that the employable group (11,895) is the largest, being 46 per cent. of the total unenumerated. Of blind persons in occupations most are engaged in basket and cane work; there are relatively few in outdoor occupations. A large number of blind children are not attending school, and of these 40.6 per cent. were returned as mentally defective. A table of the age of onset of blindness shows that 21.4 per cent. were blinded within the first year of life, the majority of them within the first month. After the first year the incidence is, roughly, 10 per cent. for each decade up to 70 years.

[Undoubtedly the ranks of the employable blind in Great Britain have been mostly recruited from the reeducated war blind; and to Sir Arthur Pearson and the influence of his pupils at St. Dunstan's is largely due this happy result. As with the blinded, so in almost every other form of military disablement; one of the (few) benefits springing from the World War will be the extension of physical reconstruction to the industrial cripples.—Ed.]

Surgical Treatment of Congenital Blindness. A historical review of the operations on record for congenital cataracts in both eyes, from Cheselden's pioneer work in the eighteenth century to Moreau's case in which the child was kept in the hospital for fifteen months afterward (1913) is given by J. de Salterain.[8] Moreau declared that removal of the cataracts is merely the preliminary to the child's learning to see, as the mental perception is a plant of slow growth. De Salterain has operated in nineteen cases for congenital blindness; one of the patients was 32 and has been capable of self-support during the twenty years since. The others were children, and he describes in detail two cases to demonstrate the necessity for continuous intelligent training in the use of the eyes. His own and the experiences of others on record show that the development of the child's mind before the operation is the deciding factor in what can be accomplished later. One backward boy of 6 was trained by the Montessori method for about a year after

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(8) Rev. méd. d. Uruguay, July, 1919.

the operation, and in nine months was mentally and visually the equal of normal children of his age. The other child whose case is described was not mentally backward, and she was soon able to attend school with other children.

Child Hygiene and Ophthalmology. A timely essay on this important subject is that of John R. Newcomb.[9] He points out that recently the relation of ophthalmology to child hygiene has gained recognition in a most gratifying manner and believes that much will be done in the next few years to further this most important phase of child welfare.

Ophthalmologic conditions which have a direct effect on the health and development of children may be roughly divided into the following groups: (*a*) congenital defects and hereditary constitutional diseases; (*b*) prenatal and postnatal traumatisms and infections; (*c*) communicable ocular diseases; (*d*) ocular disease arising from malnutrition and arrested development; (*e*) errors of refraction and anomalies of the extra-ocular muscles.

Abnormalities due to heredity, congenital, prenatal and postnatal traumatisms and infections and those due to malnutrition and arrested development are very generally recognized and in this country are now receiving prompt and thoroughly adequate attention and treatment of a corrective nature.

The communicable ocular diseases are being intelligently handled, but still further improvement could be made by the enactment and enforcement of more rigid regulations by boards of health.

An example of the unfortunate condition existing is a situation which came up during the fight against trachoma about three years ago. Children with trachoma were found and discontinuance of school attendance ordered, but the parents secured certificates from their physicians that the condition was not trachoma and the children were re-admitted to school. The disagreement in diagnosis in itself showed that a doubt existed and so long as there was any doubt as to the diagnosis

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(9) Jour. Indiana State Med. Ass'n., March, 1920.

of trachoma those children should not have been readmitted to school. Boards of health should have authority to make it impossible for a child with disease of the eyes to continue school duties and should make the requirement for re-admittance nothing short of complete recovery. A child whose eyes are in any way abnormal is not physically qualified to do school work so long as that condition exists. If the condition is of a trivial nature the loss of time from school will be insignificant. If the condition is not cured within a very short space of time it is self-evident that the disease is not trivial and it is of the greatest importance that that child be excluded from the schools for its own good as well as to safeguard the unaffected children.

Errors of refraction and anomalies of the extra-ocular muscles play an important rôle.

With the introduction of medical inspection of school children came a vast and immeasurable benefit to the community at large. Inspection of children's eyes and the most careful measurement of visual acuity can not, unfortunately, uncover all cases of abnormality. When we speak of the normal eye in childhood we have no fixed and established standard on which to base an opinion. The eye in childhood is normal only to that extent to which the normal physiologic development has progressed. All children when born have very gross errors of refraction which by a natural developmental process will be relatively overcome and when the physiologic development is in no manner interfered with the eyes very rapidly approach a state of perfection. Should this process meet with interference or be delayed the natural conclusion is that such a condition would result in manifest loss of function. Such, however, is not always the case. Eyes in which the approach toward normal is blocked will in many instances develop a compensatory accommodation which may utterly mask the true condition and which may be productive of no apparent symptoms for a dangerously long period of time. Therefore if a child's eyes possess normal visual acuity we are not justified in stating that they are normal. However, if a child's visual acuity falls below a certain established standard we may be positive of the existence of some abnormal condition. It is an everyday occurrence in the practice of ophthalmology to find children whose visual acuity is normal or even above the normal and find a gross error of refraction requiring a very strong lens to correct. It is these cases which offer the problem to the man in general practice or to the one engaged in the medical inspection of school children. Frequently these cases present absolutely no history of inadequate vision, ocular pain or headaches. The nervous system in a high percentage of cases presents the initial symptoms of ocular strain. The more frequent nervous manifestations are nervous excitability, irritability, restlessness when asleep, dreams of an unpleasant nature, contortions of the muscles of the face or eyelids and, as a direct result of the state of turbulence of the entire nervous system, faulty deportment in school and at home. Too much emphasis can not be laid on this point: that a serious error of refraction may be present without any direct ocular symptoms being present. The effect on the mental aptness of the child is frequently marked, the result of an unconscious avoidance of study and application due to the fact that such study invariably results in certain unpleasant symptoms which the child has learned, and which are always induced by the study or work of the school room.

The anomalies of the extra-ocular muscles do not produce in children the wide variety of symptoms brought about by errors of refraction nor are the symptoms observed so intense. The best advice to give the parents of the children with squint or crossed eyes is to consult a competent ophthalmologist as soon as possible. The majority of the cases of squint in children can be easily remedied and early intervention is advisable.

The rôle of the ophthalmologist, the family physician, the family and the school is one and the same and that is early and thorough examination of the eyes by a competent ophthalmologist and religious obedience to directions he may give in regard to the hygiene of the eyes and the use of corrective or remedial measures. Do not give audience to or encourage belief in the advertising propaganda against the use of drugs in examining the eyes. Children's eyes can be examined in no other way, all other claims to the contrary, and in many cases in which the correction of errors of refraction has been attempted by others than ophthalmologists the results are such as to furnish sufficient proof of the fallacy of the unwarranted and much advertised claims which we read in the daily press. "Nothing is more important to the physical welfare of a child than normal visual function and to insure that procure the best professional advice obtainable in your community, obtain it early and see to it that the advice given is followed, to the letter."

The general improvement observed in children following the correction of errors of refraction is in many instances so marked and it affects so intimately the proper functioning of various organs which have no direct connection with the eye as to be unexplainable and almost unbelievable. Ocular hygiene in children deserves the sincere attention of the entire medical profession and the ophthalmologists of the country who are particularly interested in this subject hope for such coöperation from the medical profession and the State that future generations will be less handicapped than those of the past and present. A broader comprehension and a more general appreciation of the rôle which ocular pathologic conditions play in the production of general disturbances in childhood is necessary in the interests of child hygiene.

THE REFRACTION OF THE EYE.

Refraction and the Conservation of Vision. An essay on this subject that plainly states the fundamentals of ocular hygiene, so far as the provision of glasses is concerned, is contributed by Delamere F. Harbridge.(1) In the testing of eyes for glasses, he says, it is necessary not only to know the manner of doing this, but also when not to do it. One of the strongest indictments that can be brought against the many cults, in the practice of medicine, that have sprung up, is that those who practice them do not understand the limitations of their field, and work injury not so much directly as indirectly by withholding from the sufferer competent advice at a time when aid might yet be rendered. This criticism applies particularly to those who, without knowledge of disease processes, undertake the prescribing of glasses, and little will be gained if this work be now undertaken by a physician if he be fully as ignorant of diseases of the eye as is the tradesman.

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(1) Southwestern Med., August, 1919.

The importance attached to eyestrain in the etiology of many obscure functional nervous disturbances is recognized and acknowledged by most members of the medical profession and, to a certain extent, by the lay mind. If an uncorrected error of refraction disturbs the nervous equilibrium in the adult, how infinitely important it is that we appreciate its significance to the youth. The eye, as we all know, is the organ of special sense sight; an indispensable factor in the intellectual development of an individual. Upon this development depends a proper appreciation of social requirements in modern civilization.

It is of signal importance that we appreciate the delicacy of the ocular structures in the child during the formative period of life. The stress placed upon the organ during this period in gaining knowledge is considerable but, if an additional burden, due to an error in refraction, be present, one can readily appreciate the baneful influence on the progress and general welfare of the individual.

The effect of impaired vision is varied. Some children accept the situation as it is; they become dull, stupid and indifferent to the higher and better acquisitions of life; others, ambitious by nature, by persistent exercise of the organ may develop sufficient accommodative power to overcome the defect. Impaired general health is the price of the effort. There is, however, a large class, ambitious and desirous of success who, handicapped by ametropia of a considerable degree, unable to exert sufficient accommodative power, fail in the effort. Life to such children is oblique; they are taught to think white when they see black; what they are told is straight to them seems crooked; a circle to them is round because they have been told so; to them, perchance, it looks oval.

In the matter of refracting and ordering glasses for a child, an oculist must possess a comprehensive understanding of child life. Children have active imaginations and in the course of an eye examination careful consideration in making deductions, from symptoms submitted, must be made. Lack of concentration, missing or mispronouncing words, holding the book too near, postural defects, etc., demand careful inquiry into the school life of the child. Frequently it will be found that there is something missing or that he does not understand certain points which have not been properly explained or at least have not been presented to his mind in a lucid manner.

Young children with low errors need no correction. A careful study of the relationship of accommodation and convergence is most essential. Children with high refractive errors need glasses immediately in order to preserve vision and also to prevent muscle imbalance. Mixed astigmatism and hyperopia with astigmatism cause the syndrome asthenopia and are errors of great importance not only for the immediate, but for the future welfare of the human being.

The chief object of accurate refraction is to improve both the vision and the general ability of the child. An adult should not be allowed to develop with impaired vision debarring him from the more active participation in the conduct of his affairs in life. Care, patience and experience are essential as prerequisites to a good refractionist. It is the general practitioner's duty to know that his patients are directed to one fully equipped to do this work. Improper or partial correction of an error changes the ametropia, to which the eye has been accustomed, to some other form or degree which may cause as much, if not more, discomfort, from the unaccustomed strain then put on the ciliary muscle, as the original uncorrected error.

Barring certain contra-indications, if accurate results are to be obtained, it remains the best practice to employ a cycloplegic in every patient with active accommodation. The oculist is frequently questioned by the physician as to the reason for using a cycloplegic. Cycloplegic drugs are used to hold the ciliary muscles in abeyance thus rendering the accommodative power *nil*. One would not attempt to measure the length of a rubber band which is continually contracting and expanding; one would first fix it or place it at rest. The same theory applies practically to accommodative power in relation to the estimation of refraction. The eye muscles are first placed at rest before determining static refraction. This not only affords the best opportunity for accuracy in measuring refraction, but the rest in itself is decidedly beneficial to the greatly over wrought ciliary muscles.

The oculist frequently encounters eyes which have been improperly dealt with. A conservative estimate would be to state that fully 50 per cent. of those wearing glasses are improperly corrected and fitted. Of sufficient frequency to be noted is the number of patients wearing low minus cylinders where they should have plus cylinders or those using low mixed cylinders where a plus sphere and cylinder is required or the too early use of bifocals by patients in whom the correct static refraction has not been estimated.

Following careful refraction, subsequent refractions, in the great majority of patients, do not show marked changes. If, however, there are sudden marked changes one should suspect uveal tract disturbances, possibly kidney lesions, swelling lenses, arteriosclerosis, etc. Myopia in the vast majority of cases is the result of lowered bodily health, uncorrected astigmatism, insufficient light and constant close work.

Not every headache, vertigo, carsickness, migraine or so-called stomach headache, is due to errors of refraction, yet the large percentage of such ills that are relieved by properly ordered correcting lenses is astounding, especially in persons with the various types of astigmatism and muscle imbalance.

The majority of those wearing glasses can see perfectly well without them and in many instances without serious discomfort but they do so at the expense of undue nervous and muscle energy, this in turn causing repeated congestive attacks upon the uveal tissue. Often-repeated attacks of this character, in time, establish a vicious circle which ends in the establishment of more serious organic changes; as for example, the development of myopia and its attending difficulties or, perchance, that condition consequent upon an unyielding sclera but a giving way at the entrance of the optic nerve with the resulting baneful effect, the precipitation of a glaucomatous attack. There is much to indicate that senile cataract is an inapplicable term. Essentially, cataract is the after-effect of impaired nutrition of the lens, consequent upon uveal tract disease. Uveal tract disease is dependent upon passive or periodic congestive insults resulting, in a large proportion of cases, from uncorrected or improperly corrected errors of refraction. There is much to stimulate the belief that the occurrence of cataract, glaucoma and myopia are distinctly lessened among those whose eyes are often and accurately refracted. In incipient cataract there is small doubt but that the condition is held in abeyance and that a much smaller percentage come to operation than among those whose refraction has been neglected.

Methods in Refraction. The observations made by Major John R. Newcomb[2] on examining soldiers apply equally to civilian practice. Of the ophthalmoscopic examination he properly asserts that it should be made of every case; and he remarks that a surprisingly large number of patients previously examined by oculists stated that no ophthalmoscopic examination had ever been made in the previous examinations.

The electric ophthalmoscope has been found superior in all ways and possesses advantages too numerous to mention.

The *skiascopic examination* is by far the most important phase of the examination and skiascopy is an art which can be mastered only by persistent and unlimited practice and constant practical application. The choice of skiascope is important. The most satisfactory instrument to use is equipped with a plane mirror of 18 mm. diameter, the mirror being preferably of Noviol glass, and the mirror should be tested to insure its being a true plane mirror. Irregularities in the mirror surface will lead to faulty results and this is frequently the cause of unsatisfactory results in the skiascopy. A second skiascope of but 10 mm. diameter has been found

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(2) Amer. Jour. Ophthal., May, 1919.

advantageous but it requires a great deal of practice with so small a mirror before the use of it becomes satisfactory.

The source of light is important and the most satisfactory light for skiascopy was obtained by the author from a 60-watt, frosted-bulb Mazda lamp. The lamp should be so jacketed as to keep all light off the patient's face. It should be placed between the patient and the operator on a level with the eyes.

The one meter distance between the eye under examination and the skiascope is of utmost importance and great accuracy in maintaining this distance is to be observed. A variation of one or two inches is inconsequential but beyond this slight variation error is certain to result. It is not necessary to employ any mechanical means to maintain this distance as any such appliance is apt to prove annoying and cumbersome. White marks on the black wall of the dark room indicating the distance of one meter make possible the correct placing of the chair for the patient and the stool for the operator.

Skiascopy with Trial Frame and Lenses. The use of so-called skiascopic frames is not recommended as their use leads to hurried, careless methods and the determinations made are gross determinations and merely approximate the actual correction. Experience has shown that the skiascopic correction of first one principal meridian with a spherical lens and then the correction of the opposite principal meridian with a sphere does not give accurate results in the correction of an existing astigmia. This is very frequently demonstrated in using sphero-cylinder combinations in the skiascopy of the dark room, it being no uncommon thing to find it necessary to change the sphere originally selected when the proper correcting cylinder is superimposed. For example, if a plus one seventy-five sphere is found to stop shadow movement in the vertical meridian, but is insufficient for the horizontal; and an additional seventy-five cylinder, axis ninety degrees, corrects in the horizontal it is frequently observed that the original sphere of plus one seventy-five must be reduced to a one fifty or even less. Had the correction been done with the skiascopic frames the reduction in strength of the sphere for the vertical would not have appeared necessary, and the result would have been an over-correction in all meridians. For this reason, if for no other, the use of the skiascopic frames is to be heartily condemned. It is the author's observation that the use of trial frame with sphero-cylinder combinations in the performance of skiascopy leads to far greater accuracy in results and its use is recommended. The Punktal trial case with the small lenses, and the trial frame or portable phorometer supplied with it, make an ideal equipment for skiascopy. The increased initial expense is more than offset by the very many advantages offered by its use.

The determination of the axis of an astigmia is most often made in the dark-room examination. This is true only when the skiascopy is done with the trial frame and spherocylinder lenses. Practice will enable the operator to determine with the greatest accuracy and ease the axis of astigmia, and recourse to subjective methods is very seldom necessary. To those who are exponents of subjective testing this may meet with disapproval; but the fact remains that such a determination is possible.

Newcomb calls special attention to several points:

First, the movements of the mirror should be very limited. A tilt of the mirror of four millimeters is usually all that is necessary or advisable. In some cases this range of mirror excursion will have to be extended but it will be found with practice that the mirror movements can be materially reduced in range. One of the most confusing complications of skiascopy may be brought about by too extensive mirror movements. Tilt the mirror just enough to bring out the true shadow movement and considerable confusion will be avoided.

Second: The establishment of the proper distance between the patient's eye and the skiascopic mirror. This should be one meter.

Third: The use of a small skiascope is absolutely essential for accurate results. A mirror of 18 mm. is as large as should be used.

Fourth: Proper illumination, as described. The electric skiascopes are not good because of the fact that an uneven illumination apparently is not avoidable. In

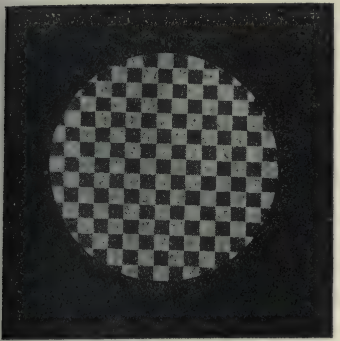

Fig. 10. The checkerboard chart as seen by the emmetropic eye.

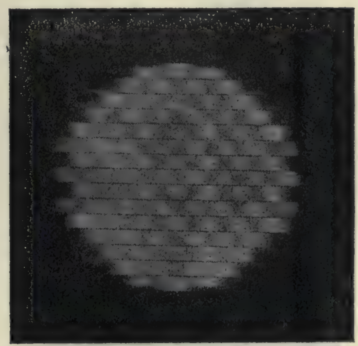

Fig. 11. Checkerboard chart as seen by an eye with simple myopic astigmia of one diopter, axis 90°, the accommodation being entirely relaxed.

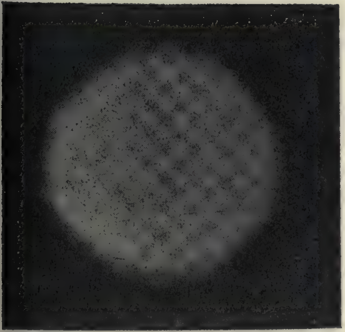

Fig. 12. Same refractive condition as above illustrated with the correcting cylinder placed at 90° instead of at 180°, the proper correcting axis.

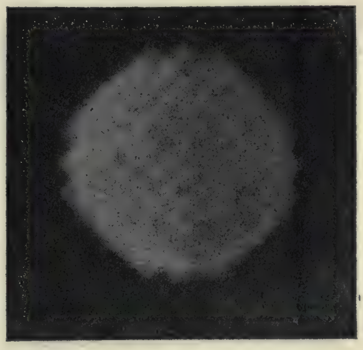

Fig. 13. Correcting cylinder placed 45 degrees from correct position.

Appearance of astigmia chart in various forms of ametropia.

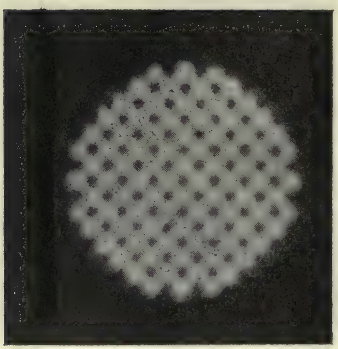

Fig. 14. Correcting cylinder placed 30 degrees from correct position.

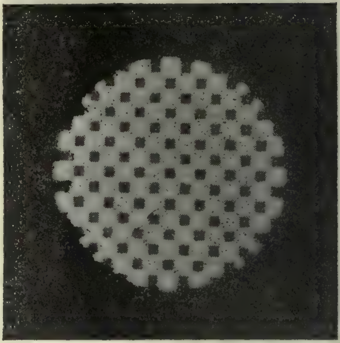

Fig. 15. Correcting cylinder placed 15 degrees from correct position.

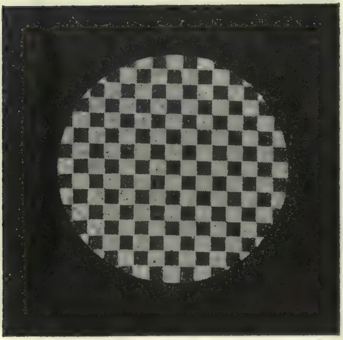

Fig. 16. Correcting cylinder placed 5 degrees from correct position.

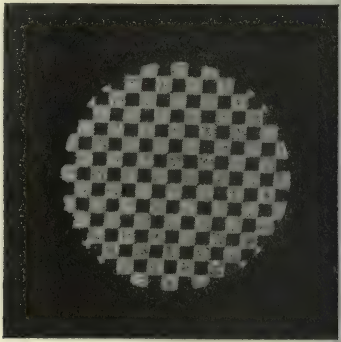

Fig. 17. Correcting cylinder placed 1 degree from correct position.

Appearance of astigmia chart in various forms of ametropia.

connection with the subject of illumination it should be mentioned that the dark room should be a *dark* room and not a darkened room. The less outside light entering the room, the better the skiascopy.

Proper application of skiascopy furnishes the ideal method of determining errors of refraction and the application of proper correcting lenses; and if carefully and accurately done it will be found that in most examinations the prescription for lenses may be written directly from the dark-room findings without recourse to the subjective methods of examination.

Subjective Tests. The determination of the axis of astigmia is not always possible in the dark-room examination and subjective tests must occasionally be resorted to. Subjective tests for determining axis are numerous and none is without its faults. The criticism to be offered concerning the majority of astigmia charts is that they are confusing and that the patient is allowed too great latitude in the formation of his visual judgment. The chart used by Newcomb possesses faults but its one recommendation is its simplicity which in turn means its greater accuracy. All tests for the determination of axes of astigmia should be made while the patient's eyes are completely under the effect of the cycloplegic and the findings thus made should not be altered, regardless of what the patient's judgment may seem to indicate, in case a post-cycloplegic test is made. Adherence to this point is absolutely necessary and deviation from it means failure.

The astigmia chart employed is illustrated in Figures 10 to 17. It consists of black and white squares, 15 by 15 m.m., alternately placed in the form of a checkerboard. The chart is 24 cm. in diameter and is circular in form.

The chart is used at a distance of twenty feet from the patient or at a lesser distance if more convenient or if necessary on account of reduced visual acuity. The patient's eyes being under a cycloplegic and the spherical lens being in place in the trial frame, the proper correcting cylindric lens is placed in the frame at the opposite axis to that which was found in the dark room to be correct, or approximately correct.

Before this lens is placed in position, in the faulty position described, the patient is advised that the addition of the cylinder will result in a very decided blurring of the checkerboard. In the words of a patient, "the squares are all mussed up." Having demonstrated this to the patient, slowly turn the cylinder, having instructed the patient to say, "stop," so soon as there appear clean cut black and white squares. With children this test may readily be turned into a game into which they enter with marked enthusiasm. There is rarely any hesitancy on the part of the patient when the proper axis has been reached, and repeated rotation of the cylinder will prove the accuracy of this test, as the patient will not vary in his selection of axis. The thing is so very simple that almost without exception there is present no confusion on the part of the patient and a repetition of the test is seldom necessary. The test is recommended as being most accurate on account of its simplicity and its use will eliminate much needless confusion and will result in a great saving of time. Its use as compared with the clock-dial and other astigmia tests will very quickly and conclusively prove its superior value.

The illustrations demonstrate as clearly as photographs can the principle of this test. The camera is made astigmatic by the addition of a cylinder to the lens system. By adding a plus one cylinder at axis 180° the camera is made myopic to the extent of one diopter in the vertical axis. In other words a simple myopic astigmia is produced. The correcting cylinder, a —1.00 is next introduced into the lens system at right angles to its known proper axis, i. e., at axis 90° instead of the correct axis of 180°.

Post-cycloplegic examinations are sometimes necessary in addition to the dark-room findings. The post-cycloplegic examination was exceptionally used by the author, and when made was really but a verification of the dark-room findings and not a post-cycloplegic examination in the broad sense of the word. Experience has shown these subjective tests to be superfluous in the majority of cases. The post-cycloplegic tests for spherical tolerance and axis are made only in cases in which the axis of astigmia has not been absolutely determined with the skiascope; and in such cases as present an error of refraction of unusually high degree, particularly if the patient has not had previous experience with lenses. The reason for this is obvious.

The routine use of a miotic has been both advocated and denounced; and yet the fact remains that it furnishes a most valuable aid, and should be used invariably and without exception following the use of a cycloplegic, in all patients over 16 years of age. In children its use is not to be advocated on account of the severe and intense ciliary spasm which is apt to result. In adults this is a rare thing, only one case having been observed over a period of eleven years constant use. It is a grave mistake for an ophthalmologist to permit a patient to leave his office under the effect of a cycloplegic except in cases in which there exists a therapeutic reason for its continued action.

The *ophthalmic disc* furnishes the ideal method of application, but during the period of the war it was necessary to revert to the use of the solution. One drop of a 1 per cent. solution of eserine sulphate placed in each eye will speedily restore the accommodation with no unpleasant effects arising from its use. Previous to its instillation, the patient is warned of the slight muscular twitching and spasm of the palpebral muscles which persists for a few minutes.

The advantages obtained from using the miotic are: First, safety—a glaucoma will not be a possibility; second: patients are enabled to return to any close work within an hour after leaving the office. There are rare exceptions to this. Frequently the ciliary function is restored in even less time but in some conditions it is from two to three hours before the full effect is gained. This varies according to the error of refraction present, the hyperopic eye requiring more time and the myopic less.

In prescribing lenses it may be well to mention that all war-time prescriptions called for *spectacles,* except in cases of simple hyperopia or myopia. If sufficient time is taken to explain to the patient the absolute necessity of having the glasses straight there will be found but little opposition to the wearing of spectacles. When patients remain obdurate it is wise and advisable to refuse to accept responsibility for the unsatisfactory results which are sure to follow the wearing of a cylindrical or sphero-cylindrical lens in any other than a rigid spectacle mounting. After the patient has become accustomed to the spectacles there is no objection to nose glasses for evening wear, for once the eyes have become comfortable following the use of the spectacles the inaccuracy of the nose glasses will speedily be recognized by the patient, due to the return of symptoms.

[If any point raised in this paper should be emphasized it is the absolute necessity of using a cycloplegic in all subjects under, let us say, middle age. To quote the words of Edward Jackson: "The use of a cycloplegic is necessary whenever it is desired to make a complete study and accurate measurement of the refraction in a patient under 50 years of age. Without it *the refraction can be guessed* at, often correctly." Many ophthalmologists would probably not depend so absolutely upon skiascopic findings for the accurate determination of the *axis of a correcting cylinder* without an appeal to a post-cycloplegic subjective test; nor would they feel called upon to use miotics after the cycloplegic in most patients under 30 years of age.—Ed.]

Overlooked Causes of Failure to Relieve Symptoms by Glasses. George M. Gould[3] offers the following suggestions:

Second only to uncorrected or incorrectly corrected ametropia, dirty lenses are the greatest cause of eyestrain. Combine these two factors and we get the acme of evil. Few patients keep the two bits of glass constantly clean and perfectly polished, as they must be to meet the demands of the eyes and brain, during every minute of the fifteen waking hours of each day. Those may be the worst sinners who have been most seriously warned and shown how to avoid or remedy the evil. And yet it can not be doubted that oculists pay far too little attention to the danger; there is usually only a hurried word of command or caution which, instead,

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(3) Amer. Medicine, August, 1919.

should be etched deeper in the mind by repetition, illustration, explanation and warning of the danger of neglect; and this despite the risk of making the patient think the oculist is a crank and exaggerator. Some will forget the advice, and some will fear breakage of lenses. Opticians should be repeatedly advised to second the efforts of the oculist in the matter. It is a good plan to give the patient a label or tag to paste on his mirror with the injunction: *Clean my spectacle lenses, now, and six times every day.* In many occupations it is more necessary than in others, because of steam, dust, fog, sweat, etc. Many lenses are set too close to the eye-ball and lashes by optician and patient. Sometimes the lashes should be slightly trimmed in order not to set the lenses too far from the cornea. Opticians themselves may be guilty in setting the lenses so they will strike the lashes.

When a patient writes complainingly, Gould may telegraph the reply: "Trouble probably lies in not keeping glasses clean." A visit to the oculist may be necessary. There is a double duty in recognizing the fact that the patient may not be cured of his systemic disease, and that the general physician will not learn the truth about eyestrain and the influence of scientific spectacles in helping him to cure the diseases he is working upon. There is no relief of eyestrain reflexes to the general system with dirty lenses Gould emphasizes.

"Next to dirty and no lenses as a cause of eyestrain and its systemic results is failure to wear the spectacles constantly. Patients, for one reason or another, will leave the glasses off, although it results in a return of the old morbid reflexes. Every patient should be repeatedly warned, begged, commanded, to wear the spectacles every minute of the waking life. And often they can not, or will not explain why they have not done so. The third blunder (or crime) is the use of eye-glasses instead of spectacles. Eye-glasses are of little or no use; and, usually increase, rather than lessen, the eyestrain. In trying to make them cling to the base of the nose they will often, or generally, be so placed or displaced that the axes of astigmatism (in scientific refractions) are changed from those determined by the trial frame and lenses. The oculist who habitually permits eye-glasses will, at least should, suffer in medical reputation because he will miss therapeutic results. Vanity is often a great encourager of eyestrain diseases. The wide-awake general practitioner should not generally permit his patients to have eye-glasses.

"If the systemic reflexes present are those often due to eyestrain, and if the patient is over 40 years of age, the cure is conditional upon wearing bifocal spectacles all the waking hours of all days. Sick patients must wear them as well abed as afoot, if awake, although 'not looking at anything in particular.' Striped wall-papers are more harmful than the unfigured. No reading should be carried on by the sick or well while abed.

"There are some occupations which require a presbyopic correction differing from that of the usual reading and writing distance correction, and nearer than the clearest distance-work. I have successfully ordered trifocal lenses in a few cases.

"Instances sometimes occur of astigmatism not at 90° or 180° and the patient (or poor optician) had replaced the dropped out lens 'up-side down,' thus instantly producing intolerable eyestrain. One of these patients came several hundred miles to have me, in a few seconds, insert the lens correctly, at the proper axis of astigmatism, thus instantly ending the patient's tormenting eyestrain.

"Another patient living 300 miles away wrote of severe eye-trouble suddenly appearing and continuing for the last week or ten days. Correspondence failed to bring any explanation, and the patient was compelled to make the long journey to my office. I at once found an almost invisible fleck on the outer surface, at the center of one of the lenses, and precisely opposite the pupil in reading, etc. 'Out in a lively wind-storm and sand blew in your face?' I asked. 'Yes.' A new lens gave relief. For stone-masons I order several pairs of plano lenses, one after the other to be used as 'fronts' until flecked by the flying bits frequently striking the face.

"Quack opticians nowadays are making the bequacked world wear big round 'sun-glasses' with colored lenses —'any color you wish,' 'to protect the eyes.' The glass itself is usually a nightmare of imperfection: they press against the eyebrows and cheeks; they are dirty; and they create eyestrain and morbid reflexes. Next week a new evil will be concocted.

"Yet another unrecognized source of eyestrain is the universal ignoring of the fact of the normal right-eyedness in the left-handed. From this results handicap in all work and function by glasses that reverse or interfere with the normal ocular and cerebral rightness and leftness governing cerebral rightness or leftness intermediating physical and psychical function and action. It should be made a crime by law to attempt making good left-handed children into bad right-handed ones. And the modern school desks are great makers of life-long diseases."

[Larsen has recently reported the results of extensive research on different kinds of glass to determine *which is the most effectual in keeping out the short-waved chemical rays,* that induce conjunctivitis, etc., while interfering least with vision. His decision is for yellow glass No. 23 (Nitsche and Günther scale). This absorbs 25 per cent. of the 580 wave rays; 50 per cent. of the 520 rays, and 85 per cent. of the 460 rays. This yellow tint is comfortable for the eyes and impedes vision very little. He adds that the macula is protected with yellow pigment in the retina, another physiologic argument in favor of yellow glass. Thus we have another certificate in favor of a particular form of tinted lenses as a protection against excessive sun light. The truth is, of course, that different conditions of the ocular apparatus call for and should be provided with different tints and thicknesses of lenses. Just what shade is appropriate to a particular condition is not always easy to determine, but, nevertheless, the empirical prescription of *one* kind or tint for all eyes is not a scientific procedure.—Ed.]

THE EYELIDS.

Autogenous, One-Piece, Epithelial Grafts for Restoring the Eyelids. Under this caption Edward B. Heckel[4] contributes a valuable paper on the subject of *ocular*

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(4) Penn. Med. Jour., September, 1919.

cosmetics. He says that the industrial soldier may equally with the military patient be a victim of accidents resulting in marked facial deformity.

Eyelids are torn, lacerated and often destroyed as the result of burns. Fortunately these burns, while severe, as a rule destroy the skin and a portion of the substrata only, leaving the underlying muscles intact. The real deformity resulting from the immense contraction following the skin destruction, producing an eversion of the conjunctiva and a constant and persistent exposure of the eyeball, which, if not corrected, will result in a destruction of the transparency of the cornea and an eventual loss of vision and often of the eyeball itself.

The problem then becomes a very simple one, for all that is necessary is so to separate the resulting cicatrix as to expose and replace the contracted muscles to their former position, cover them with an epithelial layer to keep them so and the desired result is obtained, not only a restored lid covering and protecting the eyeball but a normally functionating lid responding to all the physiologic movements of the normal lid. While this statement is true in every respect, the real problem is so to cover the defect that, when the final shrinking or contraction in the graft has taken place, it will be sufficient. In a previous communication Heckel drew especial attention to the immense shrinking which takes place in these grafts and again emphasizes it, for good results depend entirely on how adequately this shrinking has been anticipated.

An epithelial graft results in a thin, pliable skin surface, which in some instances, especially in the negro, can scarcely be distinguished from the surrounding normal skin, while the whole-skin transplantation or graft is more or less thick, bulky and in itself a deformity.

The routine followed in these cases is as follows: On admission to the hospital, preparatory to the operation, the patient is given a full bath, the head is shampooed and the face is ordered to be carefully washed with rather warm water and soap three times daily for three days. The patient's alimentary tract is looked after and his diet is restricted. The skin of his arms is carefully inspected, the one showing the cleanest skin free from defects, etc., is the one selected from which the graft is to be taken. This arm is then ordered to be "scrubbed" daily for three consecutive simultaneous days with the "scrubbing" of the face and after each scrubbing with hot water and ethereal soap, and a rinsing with alcohol, the arm is covered with sterile gauze and bandaged. The final or third bandage is allowed to remain until the graft is to be excised or shaved off. On the fourth day the patient is ready for the operation. During the preparation neither the eye nor the face is covered at any time with a dressing; if the exposed conjunctival surface is dry or irritable a bit of bichloride vaseline, 1 to 3,000, is applied several times daily to keep it moist. A general anesthetic is used as it is very desirable to have all the muscles thoroughly relaxed. Ether is the anesthetic of choice and during the administration of this the eyes are carefully covered with sterile gauze.

The operation conveniently divides itself into these four distinct stages: (1) Dissection of the lid so as to expose and prepare the underlying muscles; (2) fixing the lid in a stretched position by anchoring it with several gut sutures; (3) excision of the graft; (4) placing of the graft in position, dressing and bandage.

The first incision is made parallel with and about 3 mm. from the lid margin, or, if this has been destroyed, from the conjunctival border, cutting just deep enough to cut through the skin or scar tissue and extending it along the entire length of the lid or at least well beyond the point of eversion.

The gap is carefully widened by dissecting, superficially, the skin beyond and through the entire length of the incision. The lid margin is then grasped and pulled up or down as the case may be, up if a lower lid, down if an upper lid, and the dissection carried on till the lid can easily be stretched to a point far beyond the apparent requirements, so that the middle part of the lid margin can be placed as far above the normal line as it was below it in its pre-operative state. The bleeding from the raw surface is easily controlled; if there are any small spurting points, these can be grasped and twisted slightly with small artery forceps; the general oozing yields promptly to a few hot wet pads.

There is of course a decided redundancy in the length of the lid margin, depending on the case; sometimes the length is increased to almost twice that of normal or what it originally was. This increase is simply the result of the stretching process; Nature takes care of it very nicely after the operation and it should never be interfered with; that is, to attempt to excise a V-shaped piece is absolutely wrong and should never be done. The final shrinking takes care of this.

The second step consists of stretching and anchoring the lid. A strong silk suture is used with a needle at either end. First one needle is passed at the middle of the lid and the greatest width of the defect to be covered by passing the needle parallel with the plane of the lid from the raw surface at about the middle of thickness of the lid margin; the other needle of the same suture is passed in a like manner about 3 mm. from it. One needle is now unthreaded and the other, after holding the suture taut and putting the lid on a stretch, is passed either in the forehead or on the cheek, depending on whether it is upper or lower lid, and the two ends tied so as to hold the lid stretched. In addition another similar gut suture is inserted on either side so as to put the entire lid on a stretch. This is then carefully covered temporarily with a wet pad of cotton.

The third step consists of excising or shaving off the epithelial graft. The dressing is removed and the prepared arm exposed. It is again washed with hot water and ethereal soap mixed with alcohol and finally copiously douched with warm normal salt solution.

The arm is firmly held by an assistant. In order to put the skin surface on a stretch and flatten it so as to facilitate the removal of the graft, two pieces of wood are used, one held by an assistant, the other by the operator. These pieces of wood are 2½ x 5 ¼ inches, and have been previously sterilized by boiling. The graft is then shaved off by means of an ordinary rather broad, sharp razor. The blade is held parallel to the surface of the skin and is so directed as to shave off a thin section only, just cutting off the papillae of the true skin.

With a little care it is quite a simple matter to get a one-piece graft of more than sufficient size to cover the defect. The excised graft is immediately placed in a warm normal salt solution. The raw surface on the arm is dressed by placing over it a sterilized piece of gauze over which some bichloride vaseline 1 to 3,000 has been smeared and confined by means of a roller bandage. This dressing is not disturbed for several days after which it is redressed at intervals of a few days. Healing and epithelialization are quite prompt and perfect so that little or no scar remains.

The fourth step is the placing of the graft. The raw surface is never again exposed and should be dry, clean and free from any bleeding. The graft is carefully spread out over the raw surface to be covered and carefully pressed into place. The portions extending beyond are carefully excised with small sharp scissors, being careful to allow a little overlapping; in other words, the graft should be just a bit too large all the way around. The graft is then covered with a piece of gutta-percha tissue cut so as to be a little larger than the graft and perforated at a number of places by nicking with scissors. A bit of wet cotton is carefully moulded into shape as large as the gutta-percha tissue and about a quarter of an inch thick, and is carefully placed over the gutta-percha tissue. The whole is covered with a piece of gutta-percha tissue without perforation so as to prevent the underlying cotton pad from drying out too soon. This is then covered with a pad of sterile gauze slightly larger than the other pads; this is then held in place by a few adhesive straps so as to prevent any slipping during the placing of these at the seat of the dressing and bandage. Over this is placed a rather large pad of sterile gauze about 2½ x 5 inches and over this a similar pad of cotton. The ear on the corresponding side is protected by cotton and the whole confined by means of a 2-inch roller bandage, carefully but firmly applied by including the ear, as it is absolutely necessary that the bandage remain in place without slipping.

This dressing is allowed to remain for from four to seven days. If the patient is comfortable, the bandage nicely in place and no odor, it is better to let it remain six or seven days. The chief essential for the taking of the graft is that it be held firmly and evenly in place.

At the end of from four to seven days the dressing is carefully removed and carefully washed off with a warm normal salt solution. At the same time the conjunctival sac can also be thoroughly flushed. If the gut sutures are examined sometimes one or more are found to have cut through the lid margins, if so they should be removed. They may remain for another day or two but not longer. The second dressing should be done in the same manner as the first, and daily thereafter for three or four days after which the bandage may be omitted and the graft thoroughly covered with bichloride vaseline 1 to 3,000 and the entire area protected by a wire gauze protector.

The eye is flushed and cleansed once daily thereafter for about one week when the wire gauze protector may be omitted (Plates III and IV).

[In utilizing thin grafts the use of *lip mucous membrane* must not be forgotten. This was first suggested by Harold Gifford, for the treatment of entropion, in 1892. He has since (*Ophthalmoscope,* December, 1914) fully described his improved technique and pictured the speculum he employs for the effective removal of the graft. In cutting epithelial grafts the operator may well bear in mind the employment of sterile vaseline—that excellent adjunct introduced by Walter Parker.—Ed.]

THE CONJUNCTIVA.

Follicular Conjunctivitis and Trachoma. C. M. Capps[5] gives, mainly for the benefit of the general practitioner, the following description of follicular conjunctivitis as distinguished from true trachoma: Follicular conjunctivitis is a disease of early childhood, cases being more prevalent up to the twelfth or fourteenth year of life. It is a disease that is found in all institutions where a large number of children congregate, such as public schools, day schools and asylums. This condition seems to prevail more persistently in bad atmosphere and

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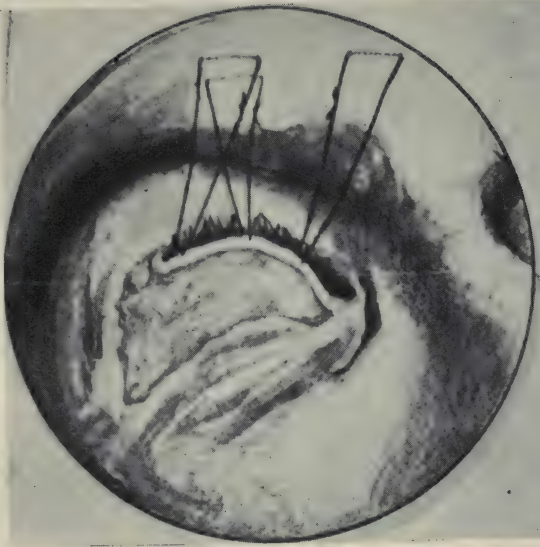
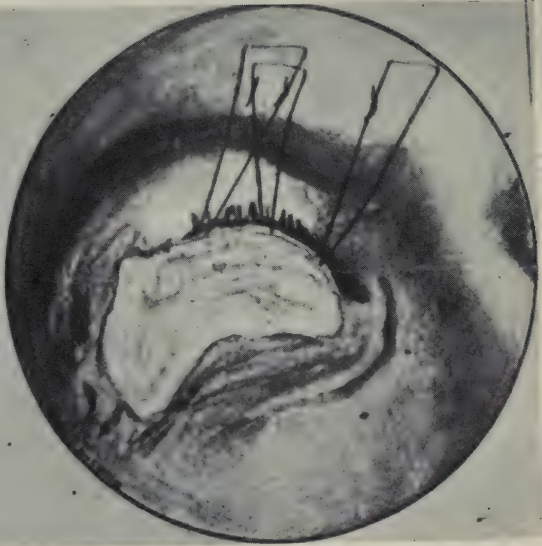
(5) Jour. Tenn. State Med. Ass'n., October, 1919.

PLATE III.

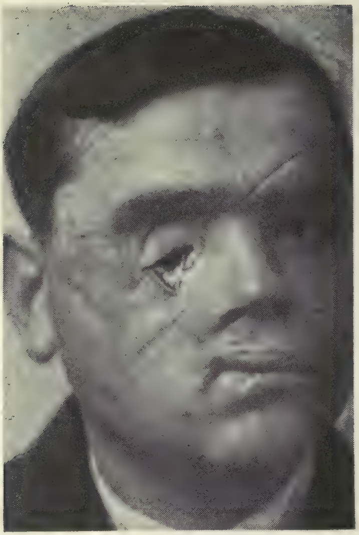


A. Restoration of the eyelid after dissection; over-correcting deformity so that lower lid is carried over upper lid and held in place by sutures.

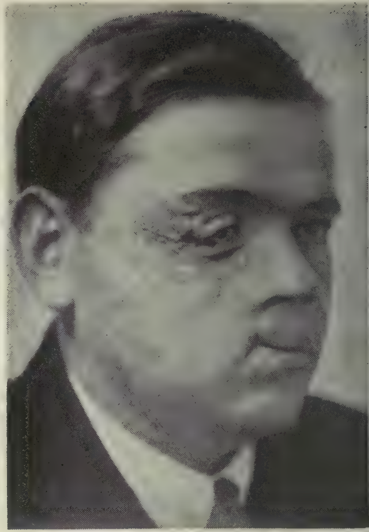


B. Restoration of eyelid. Denuded area covered with skin graft.—Heckel, page 43.

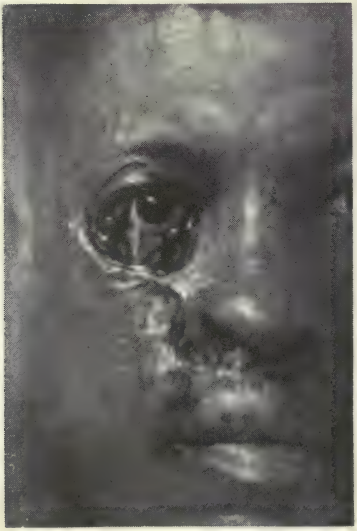
PLATE IV.



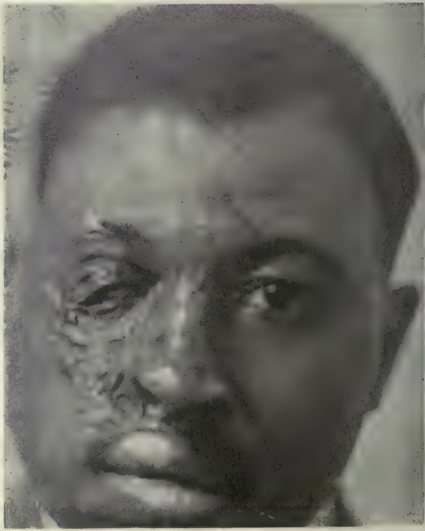
Before operation.



After operation.



Before operation.



After operation.

Heckel, page 43.

poor light; poverty and all the insanitary conditions that attend upon it seem to favor the disease, but by no means does it follow that the better classes are not affected. The history of follicular conjunctivitis is generally negative. In fact, most of the cases that come under observation are children who are examined in public institutions and their condition is then first made known to them. Neither the parents of the child, nor the child itself, are aware of any eye trouble whatever, for most of these cases do not show any inflammatory condition of the eye; the bulbar conjunctiva is normal in color, and is infrequently congested, if at all. There is no photophobia in any of the cases, and in the more severe cases lachrymation is not greatly increased. The diagnosis of follicular conjunctivitis must be made by inspection; in looking at the patient we do not see any ptosis or drooping of the upper lid—we do not see any redness of the conjunctiva except in the most advanced cases, and then very rarely; we do not see any deformity of the eye-lids, either from congestion infiltration or scars; we do not see any entropion nor ectropion; the cilia are not distorted nor disturbed; there is no pannus or corneal ulcer following follicular conjunctivitis. The only things we do find on everting the lids are follicular bodies. These bodies are always more numerous in the lower lid than they are in the upper. The follicles are almost always arranged in rows like a string of beads that correspond with the margin of the lids; we never find the conjunctiva either thickened or infiltrated by this disease; we never find scar tissue in follicular conjunctivitis. The follicles never penetrate beneath the superficial conjunctiva; the follicles are never confluent, nor run together, but always remain single and distinct from each other, and are about the size of a pin head, somewhat pale in color and puff up the conjunctival tissue. These follicles are more numerous in the conjunctiva of the fornix, and are exposed by everting the lids. Follicular conjunctivitis is not contagious.

Tuberculosis of the Conjunctiva. The following account is given by David H. Coover:[6] M. M., aged 8

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(6) Amer. Jour. Ophthal., March, 1920.

months, had double pneumonia a month before coming to the hospital. During the attack of pneumonia, an ulcer developed which perforated the cornea of the right eye. The child was very poorly nourished and emaciated.

The lids of the right eye were quite swollen and thickened. There was considerable muco-purulent discharge and a small staphyloma of the cornea. The ocular conjunctiva was quite red. On the upper tarsal conjunctiva, there was a necrotic ulcer involving one half of the tarsus. The edges were very irregular, thickened, and of a dirty gray color. The base of the ulcer was covered with grayish exudate. The conjunctiva was studded with numbers of small nodules, yellowish in color, resembling tubercular deposits. On the lower lid of the same eye, there were also a number of these yellowish nodules, some of which had coalesced and formed an ulcer of the same character as that on the upper lid. The tarsal conjunctiva of both lids was covered with an exudate which, when removed, bled quite freely.

The physical examination was negative; Wassermann negative; von Pirquet negative. The conjunctival secretion showed no specific germ. Throat culture also negative. Pulse very rapid, and temperature varying from 100 degrees to 102.

On the affected side, the pre-auricular, submaxillary, and cervical glands were very much enlarged.

A piece of the ulcer was excised and found to be tuberculous. Both the characteristic structure and bacilli were present.

The child died ten days after she was admitted to the hospital. No autopsy could be held.

James A. Patterson[7] has also reported a case of tuberculosis of the conjunctiva in a boy of thirteen years. The parents gave a history of enlargement of the parotid gland for some weeks, suspected to be mumps when first observed. The conjunctival trouble had been present all the summer and had been treated by the family physician with argyrol. The upper lid of the right eye was thickened and gave the appearance of ptosis. A large tumor mass high up under the lid prevented eversion

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(7) Amer. Jour. Ophthal., May, 1919.

unless great force was used. The bulbar conjunctiva was free from disturbance with the exception of two small reddish elevations near the carbuncle. The lower cul-de-sac contained another elevation, but otherwise the lower lid was free from invasion. There was also at that time great enlargement of the upper part of the parotid gland and of another gland located just below the malar process.

The patient did not appear to be ill, although his appetite was poor and his body weight below normal. He had been brought to Colorado for the relief of asthma, which had disappeared.

There were enlarged tonsils and adenoids, and on account of the difficulty in everting the lid it was decided to accomplish this under general anesthesia given for the removal of the tonsils and adenoids. At operation, September 25, the tarsal surface of the upper eyelid was found to be covered with large masses of granulation tissue, the majority of the granules being surmounted with suggestive pale yellow spots. Slightly to the nasal side of the center of the everted lid was a deep ulcer three mm. in diameter and penetrating to the cartilage. Thorough scrubbing of the tarsal surface with gauze exposed very tough edges of a linear ulcer extending horizontally along the entire tarsal surface, the ulcer already referred to being as it were the bottom of the crater. The hard edges were trimmed smooth with scissors, and cauterized with nitrate of silver. In removing the tonsils, a large mass of cheesy material was evacuated from the left supratonsillar fossa.

The diagnosis of tuberculosis, originally made from the glandular involvement and the general appearance of the eye condition, was confirmed by microscopic examination of the tissues, the sections showing characteristic areas of caseation and also tubercle bacilli. Photographs were presented showing the condition of the eyelid three weeks after the operation. The further treatment included applications of glycerite of tannin, trichloracetic acid, and formaldehyde. As there had been but slight improvement up to November 9, on that date the use of 1/10,000 mg. of old tuberculin once a week had been begun; the dose having been first increased three weeks before the meeting, and being now 1/5,000 mg. There was a very slight local reaction after the first two injections, and after every dose of the old tuberculin there had been some lessening in size of the glandular swelling, and at the same time a barely noticeable return of the asthmatic wheeze. Of the local applications used the most beneficial had apparently been the trichloracetic acid, once weekly. There had been some extension of the process inside the lower lid.

[In view of the rather numerous cases of conjunctival tuberculosis recently described in the literature it is of practical value to recall Eyre's five types of the disease, as the conduct of this infection is, of course, largely influenced by the form it presents. These are (1) ulcerative form; (2) miliary tubercle; (3) hypertrophic granulation; (4) lupus, and (5) pedunculated tumor. With Jackson, he believes that they all begin as distinct and generally single foci, in others words, as miliary tubercle.—Ed.]

Subconjunctival Filaria Loa. R. R. James and E. L. Hunt[8] have recorded another instance of this parasite—rare in this country. Such cases are more frequently encountered in England now that men who have been on active service in the African campaigns are returning. The published case-history is as follows:

Major T. was on active service in the Cameroons and left Africa at the end of 1916; he subsequently served in France. Beyond an occasional "tight" feeling in the chest he had had no symptoms until the evening of September 12, when he experienced a pain in the left eye, which he attributed to a foreign body. He looked at his eye in a glass and was able to see something wriggling on the lower part of the globe just under the surface. He went to St. George's Hospital, where the house surgeon could see nothing wrong with the eye and was inclined to be sceptical about the presence of a worm. However, the house surgeon advised him to consult Dr. James, who found a worm wriggling about on the upper outer side of the globe between the edge of the corner and the equator of the globe under the conjunctiva.

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(8) Lancet, Nov. 15, 1919.

It is of prime importance in these cases to fix the worm as soon as it is discovered, so after instilling four drops of 2 per cent. cocaine solution, a suture was passed through the sub-conjunctival tissue beneath the worm, thus fixing it in its position. There being no assistance at hand, Major T. was asked to hold the ends of the suture and to keep them taut. With scissors and forceps an incision was made into the conjunctiva at the upper pole of the curled-up worm; almost at once a loop of worm projected itself through the opening, and one blade of the forceps being passed through the loop, the worm was seized and pulled out. The parasite proved to be a parent female *Filaria loa,* and measured approximately 2⅕ inches in length. Under the microscope (one-sixth objective No. 6 eye-piece) the surface of the worm was seen to be studded at intervals with small protuberances. Examination of the patient's blood, some two hours after removal of the worm, failed to reveal the presence of any micro-filaria diurna, but showed an eosinophilia of about 20 per cent.

THE LACHRYMAL SAC.

Lachrymal Signs in Surgical Anesthesia. This is an original contribution to general anesthesia by the late L. T. Rutherford[1] who, after a prolonged search among modern text-books devoted to surgical anesthesia, failed to discover any reference to this subject. Cases are occasionally seen in which the anesthetist has difficulty in securing a quiet anesthesia, and in which, in maintaining a constantly flaccid abdomen or other desirable condition, the resources of his craft are taxed to the utmost. It is here especially that the activity of the lachrymal glands is of value. Since the appearance of the lachrymal secretion at the inner canthi is obvious and requires no movement of the administrator to observe it, such a sign, if reliable, will decrease his work.

The symptoms and signs observed during the inhalation of chloroform suffice to illustrate the stages of anesthesia seen when chloroform, ether, or a combination of

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(1) Lancet, May 10, 1919.

these drugs, is administered. Four stages are usually described: (1) a preliminary stage; (2) an excitement stage; (3) a stage of surgical anesthesia; and (4) a stage of overdose.

In the first stage the activity of the lachrymal glands varies according to the degree of the irritation in the nose and tubes, and if no vapor impinges on the corneæ the canthi may remain dry. With the onset of the excitement stage, however, the lachrymal glands become excessively active, and pools of secretion appear at the inner canthi and overflow on to the face. During the stage of surgical anesthesia the glands cease to secrete, and the canthi, if dried after the excitement stage, remain so. The cessation of the lachrymal secretion usually takes place a few breaths before the complete abolition of the corneal reflex, although the disappearance of the reflex and the secretion may occur simultaneously. In the stage of overdose the lachrymal glands are inactive, the canthi are dry.

The four stages seen in some cases of chloroform narcosis may be found described in every text-book, but no mention is made of the lachrymal glands. The slight variability in the time of cessation of the lachrymal secretion is of no practical importance, for in no case do the glands continue to secrete *after* the abolition of the normal corneal reflex. (The term "normal corneal reflex" is used here to distinguish it from the "diminished corneal reflex," observed after a time in an eye continuously or carelessly tested.)

The moment at which the lachrymal secretion is observed, after its cessation under the influence of chloroform or ether, provides a reliable indication of the exact moment at which to continue the administration, if a satisfactory surgical anesthesia is to be prolonged. The cessation of the lachrymal secretion during the intervening period corresponds almost exactly with the time of its reappearance during the recovery period. It is on this account that the "canthal" tear is so valuable, for it indicates that the corneal reflex is (or should be) present, and that the amount of anesthetic is as small as is compatible with a successful anesthesia. In all the cases seen by Rutherford in which the behavior of the lachrymal glands was observed, the greatest care was exercised in securing an unobstructed airway, an unembarrassed respiratory movement, and a position of the patient compatible with an adequate supply of blood to the higher centers.

The administration of such drugs as morphine, hyoscine, and atropine in a large number of cases completely abolishes the lachrymal secretion; also there are individuals, usually children between the ages of 5 and 15, in whom the lachrymal glands appear unaffected by the narcotics, and who, while under the influence of chloroform, show no evidence of lachrymal gland activity. In these rare cases the absence of the secretion is evident during induction, and this sign is therefore subsequently neglected.

The importance of the presence or absence of the lachrymal secretion in differentiating the dilated pupil of overdose from that of impending vomiting is apparent. Those who affirm that it is possible to elicit a corneal reflex when the dilated pupil of "impending" vomiting is present, will consider no further differentiation necessary. Those who agree that only in the dilated pupil of "immediate" vomiting is it possible to obtain such a reflex, will admit the value of a further test.

The condition of the pupils in impending vomiting and in overdose is very similar; both may be inactive to light, neither retains a corneal reflex as a rule, and the accompanying signs and symptoms may give but little assistance. In such cases the value of the canthal pools is evident. If the canthi have been kept dry up to the moment at which the pupils commence to dilate, and if they remain dry after the pupils are dilated, then the anesthetic must be withheld and preparations made for treating a condition of relative or absolute overdose. But if the canthi are flooded with tears, then the anesthetist should at once increase the anesthetic in order to inhibit the vomiting reflex and to secure an adequate anesthesia.

If the canthi have not been dried after the stage of surgical anesthesia has been established, and, if the anesthetist has to rely on the appearance of the corneal reflex, etc., to dispel his doubts, then vomiting will often result, for the corneal reflex appears to be inhibited in some way during the initial period of impending vomiting and reappears (if it does reappear) in the shorter period of immediate vomiting, when it is too late to prevent the onset of vomiting by increasing the anesthetic.

Those who are experienced in the administration of anesthetics, and who subconsciously observe every little detail during an administration, will affirm that at no stage should the administrator be in doubt as to the depth of narcosis; nevertheless, an easily remembered and reliable indication of the depth of narcosis is valuable.

In the course of the investigations undertaken to establish the reliability of the lachrymal activity as a means of regulating the amount of the narcotic employed over 200 patients were anesthetised for operations varying in severity from the opening of a superficial abscess to the resection of several inches of intestine. Naturally many slight variations were observed in different cases, but they were of no practical importance, and may be divided into variations (1) in the quantity of the secretion and (2) in the time at which the secretion appeared and disappeared relative to the presence or absence of the corneal reflex.

When chloroform is administered alone the quantity of the lachrymal secretion is usually small, but in uncomplicated cases it is at once evident. During the administration of ether the lachrymal secretion is abundant, and in giving mixtures containing ether the secretion does not fall much below that when ether is given alone.

In conclusion, the article states: (1) The appearance of a lachrymal secretion during anesthesia is a constant phenomenon; (2) it bears a definite relation to the depth of narcosis; and (3) since exceptions to the general rule are easily recognized, the value of this sign must be at once apparent.

Purulent Dacryocystitis. In the treatment of this disease Vacher and Denis[2] advise, for removal of the purulent secretion in the lachrymal sac, disinfection with 0.33 c.c. of chromic acid in a 1:50 solution. The remedy is injected in the inferior canaliculus, while an assistant instills hydrogen dioxide into the eye to neutralize any excess of the acid. After allowing two or three minutes for the acid to act on the lachrymal passages, they rinse them out with hydrogen dioxide. Preliminary cocainization of the eye and lachrymal passages is necessary, and mechanical clearing out of the inferior canaliculus. On the following days, the eyelids and eyes are washed in hot water, the contents of the lachrymal sac being squeezed by pressure on the internal angle of the eye. Cauterization with chromic acid has, in the writer's experience, often rendered dacryocystectomy unnecessary. It is at the same time harmless and effectual.

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(2) Médicine, January, 1920.

The Treatment of Chronic Dacryocystitis. Alpheus K. Wilson[3] is an enthusiastic advocate of extirpation of the lachrymal sac in these cases. He believes that special care must be given to the nasal cavity and to the lachrymal apparatus. A large proportion of these cases can be cured if taken in the beginning, by syringing the canaliculus with a solution of cocaine and adrenalin, followed by a few drops of argyrol; with instruction to the patient to instil, three times a day, a solution of adrenalin, followed by argyrol.

Sounds and canulas may also assist in establishing the drainage, but where it is necessary to use such measures, the relapses are very common, and treatment extends over many weeks and months. These latter methods are rapidly giving way to the more surgical procedures, as extirpation of the lachrymal sac. First, it cures all cases. Second, the simplicity of the operation under local anesthesia. Third, the rapid cure in about five days, compared with several weeks of painful manipulation. Fourth, the results are entirely satisfactory with the small exception of about 5 per cent. of persons who afterwards suffer with epiphora.

Excision of the Lachrymal Sac. This ever-interesting subject has been freshly discussed by W. C. Posey.[4] He prefers a modification of the Meller operation as follows:

Novocaine in 2 per cent. solution is substituted for cocaine, as being less toxic, and the solution is injected

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(3) Jour. Fla. Med. Ass'n., August, 1919.
(4) Amer. Jour. Ophthal., March, 1920.

with an ordinary hypodermic needle instead of with a Pravaz syringe. Not infrequently, also, if the injections have failed to control all the hemorrhage, a few minims of a solution of adrenalin, 1—2000, are injected along the lips of the wound.

Posey has ceased searching so steadfastly for every layer of tissue, and has, with some freedom, cut more deeply, searching particularly for the internal palpebral ligament. So soon as this structure becomes visible, the position of the sublying sac is secured and its dissection in most cases easily attained. In some instances, and this is especially true when the sac lies deeply, the separation of its outer wall from the orbital tissues is quite difficult and must be done with considerable caution to avoid entering the orbital fat, or perforating the walls of the sac.

The tissues about the apex of the sac are especially vascular and the severing of that part of the structure from its surroundings is frequently followed by profuse bleeding. It is well, therefore, to make this step the final one and to divide all other connections of the sac previously.

After the cavity has been thoroughly dried, carefully inspect the fossa from which the sac has been excised for any remnant of sac tissues, and remove it before closing the wound, for the smallest piece of retained mucous membrane interferes with healing. Likewise, it is well thoroughly to curette the mucous membrane of the canaliculi after these latter have been slit up, for it not infrequently happens that ectasias distend their lumen and increase the surface of mucous membrane lining them. If some of this mucous membrane is left, a troublesome mucopurulent discharge will persist, even though the sac itself has been successfully removed. In sewing up the wound, the writer does not aim specially to reunite the severed ends of the tarsal ligament, but coaptates the edges of the entire wound as carefully as possible with interrupted sutures. He observes Meller's injunctions regarding the dressing, but removes the stitches on the third day. A bandage is applied for one week. Most cases heal by first intention and some months later. In only a few has there been a trace of scarring. In one case a rather disfiguring keloid supervened.

Posey advises the removal of the sac in all cases in which there is a mucopurulent discharge from the sac, and in all mucoceles where pressure fails to squeeze out the contents of the sac either into the nose or the conjunctival cul-de-sac; also of all infected sacs prior to any operation which necessitates an incision into the globe; also in all cases of neoplasm or suspected neoplasm of the sac.

The results of the operation, in so far as it removes the source of the irritating and annoying discharge into the conjunctival cul-de-sac, are usually very satisfactory. In cases in which some particle of diseased mucous membrane of sac or canaliculus has been overlooked, the discharge persists and further treatment by curetting, cauterization or dissection is necessitated. In most instances, the irritation of the conjunctival mucous membrane is relieved and the most the patient will complain of is undue lachrymation after psychic or mechanical irritation of the lachrymal gland. The annoyance of this symptom varies according to the nervous susceptibility of the individual. Some advocate the removal of the lachrymal glands for its relief. Posey has never had recourse to this, having been usually successful in persuading the dissatisfied, that time will do much to alleviate the annoyance of which they complain.

Removal of the sac gets rid of a diseased structure, but it does not restore the lachrymal apparatus to a normal condition. Indeed it annihilates for all time the excretory mechanism. Any operation, therefore, which permits of the restoration of the mucous membrane of the sac to a healthy condition and establishes free and permanent drainage, should be regarded with favor and receive proper trial in selected cases.

The author has never attempted to establish intranasal drainage; in the first place, because he is not a nasal surgeon and lacks the special training necessary for its proper accomplishment; and he has not referred his cases to a rhinologist for this purpose, not only because, so far as he knows, there is no one in Philadelphia who has practiced this method, but also for the reason that such procedures did not appeal to him as being practical. He did not doubt the feasibility of draining the sac into the nose, but questioned the influence of nasal conditions in the sac, and the possibility of maintaining a healthy mucous membrane in the sac and free drainage into the nose under such conditions.

[It is interesting to note that even the most enthusiastic advocate of lachrymal cystectomy now recognizes the not infrequent post-operative persistence of that nuisance—epiphora. The formation of tears is unfortunately always encouraged or decidedly increased on exposure to winter weather; while in nearly all cases it becomes a distressing lachrymation when the patient faces a cold wind. Taking one case with another the best operative results in otherwise incurable chronic dacryocystitis (with changes in the lumen of the ducts) is not only to extirpate the diseased sac but to remove all or most of the lachrymal gland.—Ed.]

Intranasal Dacryocystostomy. As pointed out by Paterson and Fraser,[5] effective intranasal drainage of the lachrymal sac has always presented many difficulties. This is specially true in hospital patients, who very often do not present themselves for treatment until the disease has reached an aggravated and intense form. In many of these cases there is great dilatation of the sac with regurgitation of muco-pus on pressure, or there is tear-sac abscess, the result of the spread of the septic process to the tissues round the sac.

The old treatment of dilating the tear passages by frequent probing is in nearly all cases quite ineffective.

While a fairly large probe can usually be passed into the nose, adequate drainage is not established, and little or no lasting benefit results. Attempts made to secure better drainage by the wearing of styles, or by the introduction of threads to act as drains, have been made on a fairly large scale by some surgeons. This form of treatment, however, has never been very widely adopted, partly owing to the trouble it involves, and partly to its success being very moderate.

So troublesome are these cases of dacryocystitis that

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(5) British Jour. Ophthal., May, 1919.

most ophthalmic surgeons have welcomed and largely employed the drastic method of complete excision of the tear sac.

The operation of excision, when properly carried out, gives very good results, marks a great advance and shows a determination to treat these cases with thoroughness. The operation, however, is obviously not an ideal one, its aim being to remove the diseased tear sac and not to establish drainage into the nose and restore the function of the parts involved.

After excision of the sac a certain amount of watering of the eye nearly always exists and sometimes this watering is very troublesome. It is true that the watering is often less than before the operation, but still it is very likely to be a lifelong source of annoyance to the patient.

To minimize this difficulty, excision of the accessory tear gland has been largely practiced, especially on the Continent.

The scar left after excision is usually trivial and only occasionally unsightly. Why, then, with results relatively so good should we advocate any revision of our surgical ideas on the subject? The answer is that, in the writer's experience, the intranasal operation has given results much better than excision. Real cure of the condition with complete restoration of function is obtained.

The patients' testimony to the complete curative effect of the intranasal operation is most striking. Watering ceases from the very day of the operation, and, so far as the authors have seen, the result is permanent.

At first, cases which seemed specially suitable were mainly chosen for the operation. Experience showed that individuals with hugely distended tear sacs, or with abscess and fistula, were equally suitable.

Children present greater difficulties. For them general anesthesia is necessary, and a greater drawback is the increased technical difficulty of the operation owing to lack of room in the nose.

In children palliative treatment, such as the passage of probes, is, in Fraser's experience, much more likely to prove successful than in adults.

The details of this important paper are so valuable that they are given *in extenso* with a full account of the operative procedures carried out by Fraser. The following table gives the ages in decades, of the patients submitted to operation:

1 to 9 years = 2 cases.
10 to 19 years = 6 cases.
20 to 29 years = 3 cases.
30 to 39 years = 9 cases.
40 to 49 years = 12 cases.
50 to 59 years = 8 cases.
60 to 69 years = 5 cases.

In five cases the ages were not given.

In four patients the condition was bilateral. The right side only was affected in nineteen cases, and the left side only in twenty-seven cases.

Duration of the Disease. This varied from five weeks to ten years, the average duration of the trouble being about three years.

Causation. In the majority of cases no cause was stated. One patient said that the trouble had come on after scarlet fever, while another patient blamed whooping cough. Another patient told the writers that her mother and sister had a similar trouble. In at least two cases the patients blamed a blow in the region of the eye as the cause of the trouble in the tear sac. It is interesting to note that of the fifty cases only four occurred in private practice, *i. e.,* 8 per cent. It would appear that chronic purulent dacryocystitis is not only absolutely, but also relatively, more common among the poorer sections of the community than among the more wealthy.

Previous Treatment. The majority of the patients had been previously treated in the Eye Department by dilation of the punctum and canaliculus, washing out the tear sac and the passage of probes into the nose. In at least eighteen cases the patient had suffered from abscesses around the tear sac. Four patients had had the nose operated on (turbinectomy) before West's operation was performed.

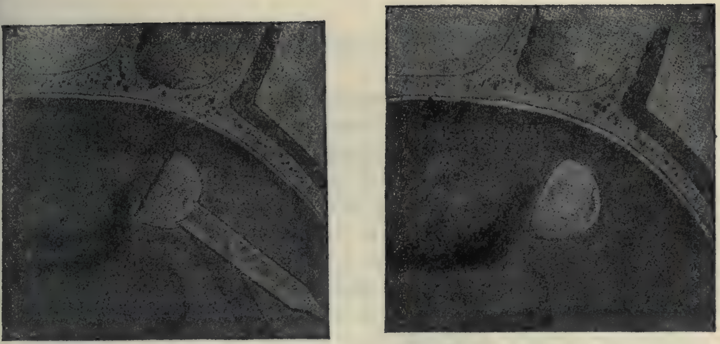
Condition of the Nose. In twenty-seven cases the nose was normal, though in five of these it was remarked that the tubercle of the septum appeared to be swollen. The other twenty-three cases showed the following conditions: Deviation of septum, obstructing both sides of the nose, one case; deviation of septum to side of tear sac trouble, five cases; deviation of septum to side opposite that of tear sac trouble, two cases; perforation of septum, two cases; inferior turbinal enlargement, two cases; general hypertrophic nasal catarrh, four cases; large middle turbinals containing air cells, two cases; polypoid middle turbinals with ethmoiditis, three cases; purulent rhinitis, one case; atrophic rhinitis, three cases; antro-choanal polypus and syphilitic lesion of lateral wall of nose, one case; perforation of the hard palate, one case. The general conclusion arrived at was that slight intranasal abnormalities had little or nothing to do with the commencement of the tear sac trouble. The findings, however, do not negative the view that the dacryocystitis had originally been due to infection passing up the nasal duct from the nose.

Tear Sac. In seven cases an abscess around the sac was present at the time of operation. The majority of the other cases showed considerable dilatation of the tear sac (in one case the sac was so dilated as to extend outward beyond the middle of the lower border of the orbit) and in all muco-pus or pus could be squeezed out at the punctum on pressure over the sac. In several cases the patients remarked that the tear-sac trouble became acute from time to time, with comparatively quiet intervals.

Technique. Fraser makes no claim to any "method" of his own. The technique finally adopted is merely a modification of that described by Paterson, of Cardiff, in the *Journal of Laryngology, Rhinology and Otology,* 1914, but where the nasal septum is markedly deviated to the affected side it is necessary as a preliminary to perform the submucous resection operation. This may be done a week or two before the tear sac is dealt with, but Fraser has always carried out both procedures at the same sitting in the small number of cases in which the septum operation proved necessary.

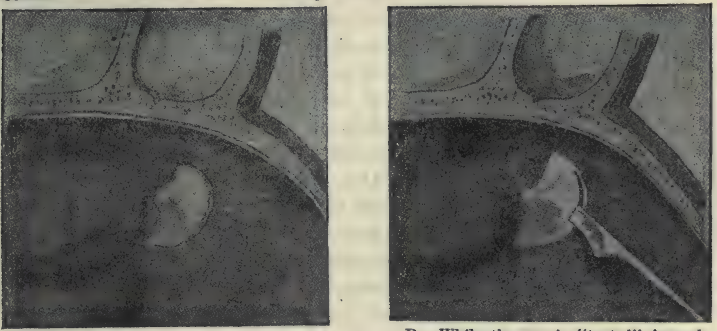
In the first ten or twelve cases the outer end of the canaliculus was slit by Paterson or Traquair before the tear-sac operation. Later, as experience was gained, Fraser carried out this small procedure himself, but during the last year he has entirely given it up as he finds that it is not necessary. All that is required is to cocainize the conjunctival sac before operation, and, after the tear-sac has been exposed from within the nose, to dilate the punctum and pass a lachrymal probe along the canaliculus into the sac.

In children a general anesthetic is advisable. Even adult patients complain of the removal of the bone with the gouge and hammer. Whether general anesthesia is employed or not, the patient is given an injection of heroine and atropine about half an hour before operation, and the region in front of the anterior end of the middle turbinal is packed with strips of narrow gauze wrung out of 10 per cent. cocaine and adrenalin (five drops of adrenalin to 55 of cocaine.) If general anesthesia is employed, as in children, only 5 per cent. cocaine is used. The patient is taken back to bed for half an hour, and is then removed to the operating table. There the intranasal packing is taken out and, with the aid of a nasal speculum and good reflected light, the mucosa covering the inner surface of the frontal process of the superior maxilla is injected with 1 per cent. novocaine and adrenalin (novocaine 20 minims and adrenalin 1 minim). From five to ten minutes later a D-shaped incision is made in this region (Fig. 18-A)—the curved portion of the incision anteriorly and the straight portion posteriorly—just in front of the anterior end of the middle turbinal. With the sharp periosteum elevator this flap of mucous membrane is raised up and removed with forceps, exposing the inner surface of the frontal process over an area about half the size of the finger nail. With the gouge and hammer the bone in this area is removed, exposing the lachrymal sac, which is dilated in the majority of these cases and bulges inward toward the nose (Fig. 18-B). Occasionally one has to remove a portion of the anterior end of the middle turbinal, but as a rule this is not necessary. Sometimes the most anterior of the ethmoidal air cells is opened up during the removal of the bone, but this does not complicate the operation as



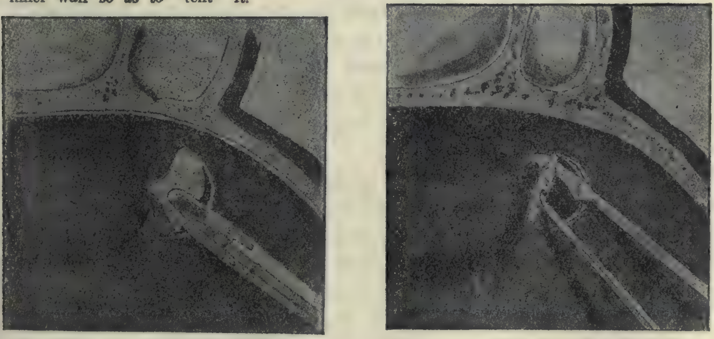
A. The D-shaped area of mucous membrane has been removed, the inner surface of the frontal process of the left superior maxilla exposed and the gouge applied.

B. The bone exposed has been removed and the dilated tear sac bulges into the wound.



C. A lachrymal probe is now passed through the lower punctum and canaliculus into the sac and pressed against the inner wall so as to "tent" it.

D. While the sac is "tented" inwards a long bistoury is used to incise the inner wall.



E. With the probe still in position, the "female" blade of a small nasal "double cutting" forceps is introduced into the sac. On closing the blades a portion of the inner wall of the sac is removed.

F. As an alternative to the procedure indicated in E, the inner wall of the opened sac may be grasped with Paterson's mouse-tooth forceps and drawn inwards to facilitate its excision with the small curved bistoury as shown above.

Fig. 18. Intranasal drainage of the lachrymal sac.

the thin pink lining membrane of the air cell is not likely to be mistaken for the dense bluish-white wall of the tear sac. The greatest difficulty met with is in those cases in which the bone of the frontal process is very thick. It is no good being too gentle as the bone must come away, and slight taps with the hammer only prolong the operation. When a sufficient area of the sac has been exposed, a small piece of gauze wrung out of 10 per cent. cocaine and adrenalin solution is packed into the region, and the intranasal operation temporarily abandoned, while the punctum is being dilated and the lachrymal probe passed into the sac. The nasal speculum is now introduced again, the gauze removed from the nose, and the inner wall of the sac made to bulge inwards by pressure on the lachrymal probe, carried out by an assistant or nurse (Fig. 18-C). The sac is next incised with a small, sharp-pointed, curved knife, as far forward as possible (Fig. 18-D). A pair of double cutting forceps is now introduced, so that the female blade lies inside the sac, while the male blade lies against the inner wall of the sac. On closing the forceps a piece of the inner wall is punched out (Fig. 18-E). One finds that pressure kept up with the lachrymal probe, after the sac has been opened with the knife, causes the incision to gape, and facilitates the entrance of the female blade of the forceps into the sac. As an alternative to the use of forceps one may, after opening the sac as described above, grasp the inner wall with Paterson's long mouse-toothed forceps. The inner wall is then drawn inward toward the nasal septum, and excised with the small curved bistoury. This latter procedure is only suitable in a fairly roomy nose (Fig. 18-F).

The operator makes no attempt to replace the original flap of nasal mucous membrane, and does not find that there is any tendency to dryness or crusting in the region of the operation. There is some bleeding from the nose an hour or so after operation, when the effects of the local anesthetic have passed off. Further, as is usual after nasal operations in which cocaine and adrenalin have been used, there is considerable obstruction of the nose on the side of operation for two or three days.

The writer further remarks that in one case the anterior ethmoidal cells were diseased, and were opened up and cleaned out at the time of the operation on the tear sac. In only one case was it found impossible to expose the sac sufficiently by the intranasal route. (The patient was a builder, and the trouble in the tear sac had followed injury to the lower part of the forehead and root of the nose, due to the fall of a heavy stone lintel on this region. At operation it was found that the bone of the frontal process of the superior maxilla was so thick that the inner wall of the tear sac could not be sufficiently exposed.) Opening of the sac was almost invariably accompanied by a very free escape of pus into the nose. In several cases the pus had an extremely foul odor. In about a quarter of the cases the operation was rendered somewhat difficult on account of the narrowness of the nose, and in three the submucous operation was performed immediately before the operation on the tear sac. In seven cases the bone of the frontal process of the superior maxilla was very thick. In one case there was considerable bleeding from the anterior part of the incision in the nasal mucous membrane, and the local application of adrenalin did little good. When, however, the facial artery on the same side was compressed by an assistant, the bleeding was at once controlled, so that the operation could be completed successfully.

One case appears to be of special interest. The patient was a female of middle age, who suffered from antro-naso-choanal polypus on the left side. The left nasal cavity contained much pus. The patient had complained of pain over the left side of the face and trouble with the left tear sac for a year. This suggested the possibility of malignant disease. Operation was performed under general anesthesia, the left tear sac being dealt with first of all. The radical operation on the left maxillary antrum was next performed and it was found that the cavity was full of pus and polypoid mucosa. The inner wall of the antrum had completely disappeared and the large choanal polypus was thus easily removed through the antral cavity and mouth wound. Tissue removed from the walls of the antrum was submitted to a pathologist who found giant cells and reported the condition as tuberculous. Subsequently, however, a history was obtained from the patient of syphilitic infection, and the Wassermann reaction proved positive. The patient made a good recovery from both antral and tear-sac troubles.

In the majority of cases the operation only occupied from ten to fifteen minutes from the time of making the incision until the inner wall of the sac had been freely removed and intrasal drainage established. In only a few instances did the operation extend to half an hour.

Complications. The operation is followed by a little redness, swelling, and tenderness externally, in the region of the tear sac, in the majority of cases. In only four was there a sufficient amount of bleeding into the tissues to justify the use of the term "black eye" as a complication of the operation. *In none of the cases were there any other disagreeable after-effects.*

Stay in Hospital. Seven of the patients did not stay in hospital at all but were operated upon as out-patients. Of the other forty-three (with the exception of the case of the builder already mentioned, who was in hospital six weeks) the average stay in hospital was four days.

Results. Of the fifty persons operated upon, forty-eight reported—twenty-four in person and twenty-four by letter. The twenty-four patients who returned for inspection were seen by one or other of the writers at periods varying from three months to three years after operation; nineteen of them were completely cured, *i. e.*, there was no watering of the eye and no discharge of mucopurulent material on squeezing the sac, while the intranasal opening was free; two of the patients still complained of slight watering of the eye; while in three cases the operation had not been successful, *i. e.*, there was discharge of muco-pus from the sac and closure of the opening into the nose. Two of these three patients were operated upon again. One was a child of 5 years and the second operation also proved unsuccessful as it was found to be impossible to make a free opening between the sac and the nose, mainly on account of the small space available. The other patient was seen a month after the second operation, when the condition was entirely satisfactory. The third unsuccessful case was that of the builder already mentioned.

Twenty-four of the patients, who lived in the country, reported by letter. Of these, nineteen stated that they were completely cured. One patient reported that there was still slight watering of the eye and one reported that the tears gathered at the inner corner of the eye, causing a slight swelling, and only passed into the nose when the "lump was squeezed." Three of the cases appear to have been comparative failures, *i. e.*, the patients still complain of some purulent material gathering in the sac and of the tears running down the cheek.

Taking these two groups together, of the forty-eight cases which reported, thirty-eight may be regarded as complete cures (about 80 per cent.); five cases as considerably improved (10 per cent.); and five cases as comparative or complete failures (10 per cent.).

SCLERA AND CORNEA.

Brittle Bones and Blue Sclerotics. Walter D. Wise[6] reports a case of this combination. Charles W., aged 5, was seen August 4, 1919. His mother stated that he had been playing on the floor when suddenly he complained of his leg and began to cry, refusing to put weight on the foot. He did not fall, and had not been engaged in any game or been doing anything that would have been likely to cause an injury. The leg was swollen and tender. There was a slight deformity just above the ankle. A roentgenogram revealed a fracture of the lower third of the tibia, and the upper part of the fibula. The child was a well-nourished, fairly well-developed boy with no signs of scurvy, rickets or any constitutional disease. However, it was noted that his sclerotics were of an azure blue. It was then seen that his mother had sclerotics of the same color. She gave a history of having had, in her life, three fractures of the right humerus and two of the left, all from trivial causes. The mother's father was reported to have the same type of eyes and to have had fractures of the clavicle and humerus,

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(6) Jour. Amer. Med. Ass'n., Nov. 29, 1919.

but apparently from rather severe falls. The patient's two brothers had blue sclerotics, but had had no broken bones. One sister with the same colored sclera had sustained a broken forearm as the result of her mother's having fallen with her—probably a legitimate cause.

The leg united in the usual length of time without deformity or any unusual feature.

[Among the recent observations of this peculiar complex is the association of otosclerosis with blue sclerotics and brittle bones. For the discovery of the aural complication we are indebted to Frank A. Conlon whose article in the *American Journal of Ophthalmology*, October, 1918, fully describes the matter. The student will also find that Sydney Stephenson's essay on the whole subject (*Ophthalmoscope,* p. 278, 1915) leaves little to add.—Ed.]

Unilateral Anesthesia of the Cornea and Conjunctiva. The subtitle of a paper on this subject by E. D. Friedman[7] is a diagnostic sign of coma due to hemiplegia. The writer refers to the fact that a physician may at any time be confronted with the necessity of determining the cause of coma; it is often difficult to say whether one is dealing with a postepileptic state, uremia, some toxic condition, or hysteria. It is known that in profound coma all reflexes are abolished; but in cases of moderate stupor or confused states this sign has helped to establish the diagnosis. The sign is a unilateral anesthesia of the cornea on the side of the hemiplegia, that is, the side opposite the lesion.

It has long been known and recently emphasized that the unilateral diminution, or absence of the abdominal wall reflexes, is an important sign of hemiplegia. The author found that in some instances, particularly in women with flabby abdominal musculature, it was difficult to elicit this sign. In such cases, and in all others for that matter, the unilateral absence of the corneal reflex is very helpful.

One must recall that the corneal reflex is a consensual reflex. The introduction of a foreign body into one eye produces a winking reflex in both eyes. This reflex is essentially protective, and apparently belongs to those

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(7) Jour. Amer. Med. Ass'n., June 21, 1919.

mediated through the brain. It can be elicited by carefully passing a small blunt object along the conjunctiva to the corneal margin. One must guard against reaching the pupillary area because of the possibility of eliciting a visual reflex, which is present even in moderately stuporous cases. Friedman has found this reflex absent in practically all hemiplegias with, and without, coma. He has not yet had occasion to study this sign in cases of crossed hemiplegia.

In looking through the literature Friedman found only a single reference to this subject, one by Milian, who attributed the loss of the reflex to the lesion of the facial nerve, that is, the motor arc, and thought that in crossed lesions the abolition should occur on the same side as the facial paralysis. Friedman takes issue with him, because if the absence of the reflex were due to interference with the motor arc, the consensual reflex should still be present on the other side. The sign should also disappear with the return of innervation of the facial nerve, which occurs in many cases. Friedman found, in his cases, no evidence of a consensual reflex, and, in some cases, he has been able to elicit the reflex on the paralyzed side by testing the cornea of the healthy side. This proved that the abolition of the reflex was not due to interference with the motor arc but due to the anesthesia of the cornea and conjunctiva.

The anesthesia of the cornea may be due to the presence of sensory fibers in the motor pathways, which are injured by the lesion causing hemiplegia, or, what seems more likely, is due to Monakow's diaschisis, with radiation of the insult to the sensory tracts. In cases with pure lesion of the motor tracts this sign tends to disappear after a few days. In lesions close to the thalamus, there is a tendency for the hemi-anesthesia to persist.

Among the author's cases there have been many in which this has been the only sign of hemiplegia. In one case of what looked like a spasm of the cerebral vessels with transient right-sided hemiparesis and doubtful Babinski, there was an absence of the corneal reflex on that side, thus proving the delicacy of this test for hemiplegia.

This sign should be especially valuable to the ambulance surgeon. It would help him in the differentiation of comotose states, so that he would not be too ready with the diagnosis of alcoholism. It is also very important from the standpoint of therapy. Given the diagnosis of hemiplegia, the treatment will necessarily be purely expectant, quite the opposite of the active treatment necessary for uremia.

There is only one condition that would present difficulty in diagnosis. That condition is fracture of the base of the skull, involving the posterior fossa with injury to the trigeminus. In such cases, however, evidence of injury to the other nerves of the posterior fossa, the roentgenographic findings, the possible presence of blood in the spinal fluid, and the subsequent clinical course would help in the differential diagnosis. It is the author's hope that the test will be tried, and its value established through extensive observation.

Swallowing Reflex from the Cornea. W. F. Schnyder[8] has made a number of experiments for the purpose but was eventually unable to determine that a swallowing reflex could be induced by excitation of the cornea or that if it occurred it indicated abnormal conditions in the cornea.

Harvester's Keratitis and Corneal Ulcer. Like all ophthalmic surgeons of experience, Chenet[9] repeats the old warning that even the slightest denudation of the cornea when there is an infectious process in the lachrymal passages is liable to induce serious corneal ulcer. Eleven such cases were recently under observation during harvest time, all requiring surgical measures, and all impairing vision to some extent. All the men had chronic lesions in the lachrymal passages.

Keratitis Profunda with Microscopic Examination. F. H. Verhoeff[10] has published a report of such a case (Figs. 19 and 20) and concludes that *disciform keratitis may be produced by a variety of causes,* and from an etiologic standpoint is therefore not an entity.

Certain cases of disciform keratitis are of the same nature as keratitis profunda.

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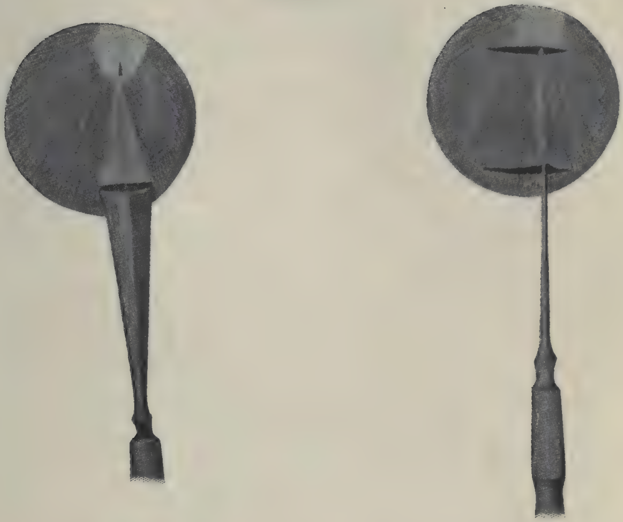
(8) Cor.-Bl. f. schweiz. Aerzte, Sept. 11, 1919.
(9) Médicine, January, 1920.
(10) Southern Med. Jour., July, 1919.

PLATE V.



A. B.

Mayou-MacHardy Iridotomy Method.—Mayou. page 77.

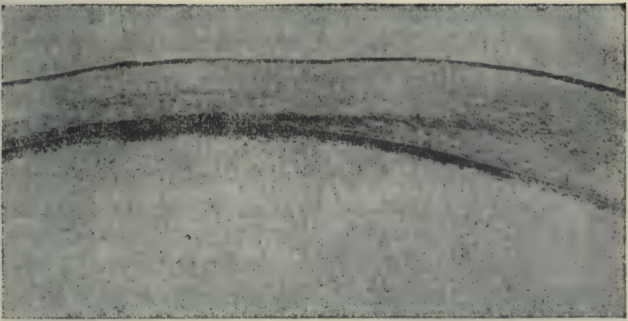


Fig. 19. Median vertical section of cornea, including upper half of affected area. (The other half of the area not included in the photograph presented a similar appearance.) The epithelium is intact, but altered. The anterior layers of the central portion of the cornea are devoid of nuclei. In front of Descemet's membrane, the corneal corpuscles have actively proliferated, forming a layer which rapidly widens out and disappears at the periphery. In the middle layers of the cornea, some of the corpuscles are in various stages of necrosis, others are in active proliferation. There is no infiltration with leukocytes. The endothelium is absent, and the posterior surface of the cornea is coated with fibrin and leukocytes. Hematoxylin and eosin. Photo x 41.

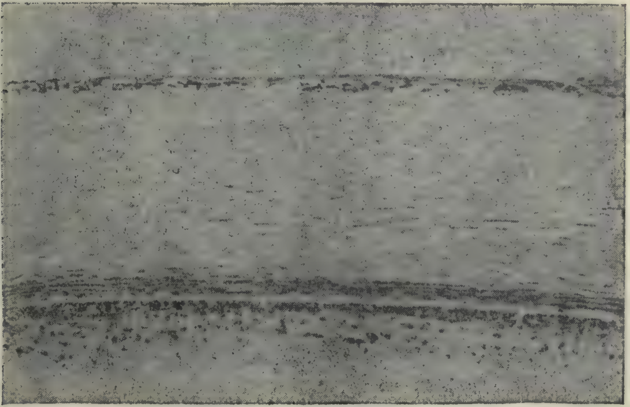


Fig. 20. Section of central portion of affected area of cornea under higher magnification. Hematoxylin and eosin. Photo x 150.

The corneal changes in keratitis profunda are due to the action of diffusible toxic substances arising near the anterior surface. The changes consist in alteration of the epithelium, destruction of the corneal corpuscles and injury to the stroma in the anterior layers of the cornea, and proliferation of the corneal corpuscles behind and around the injured area. In addition to this, there is injury to, or destruction of the endothelium, and in severe cases, deposition of fibrin and leukocytes on Descemet's membrane behind the affected area. Leukocytic infiltration of the corneal stroma is conspicuously absent.

The microscopic findings in the present case strongly indicate a neuropathic origin for keratitis profunda.

THE UVEAL TRACT.

Color of the Eyes during Infancy. A recent editorial[1] draws attention to the fact that the eyes of infants are almost invariably deep blue during the earliest weeks of life was recorded centuries ago. Modern investigations have furnished a clue to the explanation of the color changes in the iris during early infancy. The blue color is alleged to be due to the paucity of pigment in the stroma of the iris. This tissue is still very thin in early life, so that the posterior layer of pigment in the eye is plainly apparent through it. With increasing age, the stroma thickens. If no further pigmentation takes place in it, the iris tends to manifest a light blue or a gray shade; but when pigment is deposited in the iris layers, this organ becomes brown. Even in negro infants the iris may be blue in early life.

The progress of the changes of color shows some uniformity when large numbers of infants are observed. Doubtless they vary for different localities and races, which are well known to exhibit characteristic eye colors

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(1) Jour. Amer. Med. Ass'n., Nov. 18, 1919.

that show a hereditary constancy. The blond complexion of the Scandinavians is associated with the light blue, or less pigmented, iris. In a group of persons examined in Munich, only 32 per cent. of the adults retained the blue iris. Among the children of these persons the rate of alteration in iris color varied considerably. In the first three months of life three-quarters of them still retained the blue color; in six months it was still characteristic of 70 per cent. of the infants; at the ages of 9 months and 1 year the blue-eyed infant population represented 63 per cent. and 53 per cent., respectively. These data thus indicate the slow progressive pigmentation of the eyes leading to darker iris colors in the Bavarian groups examined.

Schindler has called attention in this connection to observations made in Pfaundler's clinic at Munich on a possible correlation between the rate of pigmentation, with corresponding change in the color of the iris, and the nutrition of the infant. According to her, the iris of many malnourished young, particularly among those suffering from somewhat chronic disturbances of digestion or metabolism leading to atrophic manifestations, may exhibit a change of shade at an age when healthy infants as a rule still retain the blue color. The appearance has been described as a dirty gray shade, sometimes fusing into a brownish tint.

If the premature pigmentation of the iris in early infancy is, in fact, a symptom of severe metabolic disorder—a suggestion which further careful clinical observation should help to establish or refute—its cause becomes an immediate occasion for speculation. In the absence of further experimental investigations on the subject, the Munich pediatricians conjecture that the darker color of the iris of malnourished infants is due to a deposition of pigment arising from augmented disintegration of blood pigment. Hemosiderosis has been described in the liver and spleen of atrophic infants. By analogy, a deposition of pigment elsewhere might be expected. At best, however, this is theorizing, for it is not even known whether the pigment of the iris is actually derived from that of the blood.

Polycoria. Marin[2] has reported a case of congenital polycoria of both eyes. There were three pupils in the iris of the left eye, and the normal pupil was decentered upward and nasally and was elliptical in shape. The other two occupied the lower temporal margin with only a fine strand of iris separating them. The right iris had five pupils. The normal pupil was in its proper position, and another irregular pupil, 4 mm. in diameter, was located on the external margin. The other three were situated in the superior portion and only separated by a fine membrane. They were about 1 mm. in diameter, and were best seen with oblique illumination. The fine strands separating the pupils were not provided with epithelium.

Other congenital anomalies were present in both eyes. In the left he found myopia, disseminated chorioiditis and some myelin fibers on the inferior portion of the disc, and the right had a cataractous membrane. The boy's mother and father were first cousins, and all of the family of eight children showed some evidences of congenital anomalies due to heredity, the result of consanguinity.

Iridodialysis. W. C. Bane[3] presented a man of fifty-five years who had on March 13 been struck in the right eyeball with a leather tip which had flown off a whip with which he was striking his horse. Blindness was immediate, and the pain was very severe for about a day, but no attention was sought for the eye. Seen on March 18, the iris was found to be detached at the upper outer margin over an extent of about 5 mm. There was blood in the anterior chamber. Vision was of the hand moving at one foot and the tension was reduced to 6 mm. of mercury. Under atropine in 1 per cent. solution, a cantharides-collodion blister to the temporal region, and small doses of calomel and aspirine internally, the general condition of the eye had improved, and the vision had risen to 4/60.

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(2) Ophthal. Literature, May, 1919.
(3) Amer. Jour. Ophthal., July, 1919.

A Revived Iridotomy Method. The following method of performing iridotomy has been practiced by M. S. Mayou[4] for the last fifteen years. Taken as a whole he has found it more successful than any other method which he has tried, as it yields a much larger opening, and is therefore less liable to be closed by subsequent inflammatory exudation. He makes no claim of originality for the operation, indeed, since writing the paper he found in the *Report of the Ophthalmic Department of King's College Hospital,* Vol. VII., 1900, a case recorded in which the operation had been done by Mr. MacHardy.

The operation is usually performed under a general anesthetic, but this is not essential.

First step. The surgeon stands facing the patient on the same side as the eye to be operated on. A long, narrow, bent broad cutting needle is passed into the anterior chamber from the limbus downward and inward, and is driven directly through the iris and underlying capsule. The needle is then made to pass in an upward and outward direction behind the iris into the pupillary area above, or if no pupil be present, again through the iris (Plate V—A). The bent broad needle is made to cut laterally by slightly deflecting the handle so as to produce a band of iris and capsule; the cutting needle is then withdrawn. Care should be taken so far as possible to prevent the loss of aqueous.

Second step. A Tyrrell's hook, bent to the correct angle, is passed beneath the band (Plate V—B), which is drawn into the wound and removed with iris scissors. A large opening is thus obtained with a minimum amount of trauma. If the hook should slip, the band may be seized with iris forceps, withdrawn from the wound, and removed.

The operation has the advantage that if it fails from blocking of the opening by inflammatory tissue, a tight fibrous band is formed between the old wound above and the new wound below, and this can subsequently be divided with a pair of fine iris scissors through a lateral incision at the limbus; the tension of the band will cause it to spring apart when divided.

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(4) Brit. Jour. Ophthal., p. 124, March, 1920.

Sarcoma of the Iris. F. G. Antill Pockley[5] reports one of these unusual cases. The patient, a man aged 46, first consulted Pockley on February 13, 1917. He gave a history of epiphora in the left eye of five years' duration. The color of the eye had changed during the past two years from bright blue to brown. He had had severe headaches, and for two months much pain in the eye. The vision was failing. On examination it was found that the right eye was apparently normal. The iris was light blue in color. The vision was 6/5. The left eye was in a condition of moderately acute glaucoma. The tension was + 2, and with Schiötz's tonometer the corneal impressibility was sufficient to yield pulsation on two divisions with the third weight (10). The pupil was half dilated. The anterior chamber was deep. The cornea was hazy as a result of tension. The iris appeared to be dark brown in color and to be flat. There were no signs of a tumor. Toward the limbus on the nasal side the iris was bright blue. There was a faint uniform reflex from the fundus, but no details were visible through the hazy cornea. No spots of keratitis punctata were detectable through the corneal haze.

A cyclitic condition was suspected, on account of the deep anterior chamber and of the history of a change in the color of the iris. Eserine, purgation and leeches were tried without benefit, and on the second day the patient was informed that an operation was necessary, notwithstanding a considerable risk. A sclero-corneal trephining, with a complete iridectomy, was performed. The eye recovered without any reaction. Four days later a few spots of exudate were seen on the anterior surface of the lens capsule, and three or four spots of definitely pigmented keratitis punctata on the back of the cornea. Save for heterochromia the iris appeared normal. The fundus was hazily seen. The vision was $^{6}/_{24}$. On April 1, 1917, the vision of the left eye was $^{6}/_{6}$ with — 0.5 sph. and — 0.5 cyl., and a few letters of $^{6}/_{5}$. The man was not seen again until July 9, 1917, when the vision was unchanged, but large masses of a cheesy-looking substance of a slightly browner color than cheese were seen

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(5) Med. Jour., Australia, Feb. 8, 1919.

all over the anterior surface of the iris. The pupil reacted readily to light and the eye was quiescent. No keratitis punctata was visible. No satisfactory explanation of the condition was forthcoming. The patient was treated with large doses of potassium iodide and mercury by inunction. Five days later the patient had an attack of acute iritis and keratitis, with hypopyon. The tension at that time was + 2. This condition yielded to treatment with atropine, and nine days later the eye was in exactly the same condition as before the attack, with the exception that the vision was $\frac{6}{6}$ (partly), and the tension was still somewhat raised. The condition remained unaltered for about six months.

The patient was next seen on Sept. 23, 1918, when he stated that his vision had been failing for about six months. There was a cataract in the left eye, marked gross keratitis punctata, presenting a greasy appearance, and some spots of the same character in the anterior capsule. The appearance of the iris was the same as that seen a year before. There was a large hypopyon-like substance in the anterior chamber, having a coarse granular appearance. It looked just like wet coffee grounds. Excision was recommended. Sections of the iris revealed typical multiple melanotic sarcomata.

[The Editor is naturally pleased to read that in Pockley's paper enucleation of the eyeball (instead of iridectomy) is recommended for the treatment of iris sarcoma, because when Brown Pusey and he published (*Archives of Ophthalm.,* No. 4, 1902) a rather comprehensive study of this neoplasm they were then (and are still) decidedly of the opinion that safety demands the more extensive operation.—Ed.]

Radical Cure of Gonorrheal Iritis. The complete cure of any chronic or recurrent eye disease is so important that the method of S. H. Browning[6] is well worth considering. He remarks that gonorrheal iritis, being a late sequel of gonorrhea, is not as a rule seen first hand by a specialist in venereal diseases, with the result that it is more often than not treated as a local affection. In this way it has come to be talked of as "recurrent iritis," whereas few if any cases of gonor-

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(6) Brit. Jour. Ophthal., March, 1920.

rheal iritis ought to occur in the first place, and certainly ought not to recur if properly treated.

The object of the author is to show that by proper treatment of the genito-urinary tract and the cure of the disease existing there, a permanent cure of the gonorrheal iritis will follow; also to bring to the notice of ophthalmic surgeons their responsibility in seeing that cases of gonorrheal iritis are adequately treated. Gonorrheal iritis is, Browning thinks, a toxic condition and is not due to the presence of the gonococcus in the eye, for this organism has only been isolated from the eye in one case (Sidler-Huguenin), and then only from the blood-stained exudate from the anterior chamber of a patient suffering from acute gonorrheal septicemia. He has examined the gelatinous exudate from cases of gonorrheal iritis but has not been able to cultivate the gonococcus or to find the organism in direct smears. These experiments were carried out under the most favorable conditions as the exudate was in all cases plated out on to suitable media within a few seconds of being drawn off.

Then, again, the rapid cures sometimes seen after vaccine treatment more closely resemble recovery from a toxic condition than a microbic one.

That the iritis is gonorrheal is suggested by the following observations:

1. There is generally a definite history of gonorrhea some years previously; and Browning has never seen a case of iritis during the acute stage of an urethritis.
2. The specific reaction to gonorrheal vaccines.
3. Its association with gonorrheal rheumatism, though this is by no means invariably the case.
4. The recurrence of iritis or exacerbation of symptoms after prostatic and vesicular massage, probably due to the liberation of toxins and bacteria—dead or alive—into the blood stream.
5. By negative evidence; that is to say, by eliminating so far as possible all other sources of infection such as pyorrhea, septic tonsils and ears, cystitis, alimentary infections, etc.

He has not mentioned the complement-fixation test in the above list, as he did not apply it in any of his cases because in his hands it has not yet proved reliable.

Treatment is considered under two headings, preventive and radical.

The preventive treatment of gonorrheal iritis really rests with those who see the gonorrhea in its early stages, as no case of gonorrhea can be said to be cured till the prostate and vesicles have been carefully examined, and proved by repeated examination of their contents, expressed by massage, to be free from infection. Examination with the urethroscope should also be carried out. Browning believes that if the above examinations were done by a specialist in genito-urinary work and a bacteriologist familiar with the examination of urines after massage, there would be no such eye condition as ''gonorrheal'' iritis.

For the radical treatment of gonorrheal iritis he makes the following suggestions:

1. The immediate treatment by the ophthalmic surgeon.
2. The immediate treatment by vaccines.
3. Continued treatment by vaccines and prostatic and vesicular massage with treatment of the urethra if necessary.

Of the immediate and continued treatment by the ophthalmic surgeon it may be said that the responsibility generally rests with him as to whether the subsequent treatment is advised or not.

The immediate treatment by gonococcus vacccines is essential if the best is to be done for the patient. The acute attack is often cut short and the relief to the patient as regards pain is definite.

An autogenous vaccine should be used if possible, but while this is being prepared suitable doses of a reliable mixed vaccine may be given.

That vaccine therapy has rather gone out of fashion and repute the last few years is due to the haphazard use of commercial vaccines by persons unskilled in vaccine therapy. Vaccines freshly prepared from many strains are necessary for stock use, and this is seldom obtained in those bought in a chemist's shop.

The dose of vaccine varies with each patient, but

Browning has used initial doses of from 5 to 500 millions with success. Vaccine therapy is an aid to general medical and surgical treatment and is in no way intended as a substitute.

Practically every case of gonorrheal iritis he has examined or has had examined, has shown some disease of the prostate or vesicles, and massage of these organs has shown the presence of pus cells and often gonococci. The cure of the iritis depends on the cure of the accompanying prostatitis or vesiculitis and this is generally brought about by massage.

Gonococci are not found in all cases of iritis, but this is probably due to the difficulty of detecting the organism which is often swollen and stained badly, or is lost in a mass of spermatozoa, pus cells, epithelium, and other organisms, but the fact remains that even when the gonococcus is not found the iritis is cured when the urine examined after massage repeatedly gives a normal desposit.

Browning does not think that iritis is often due to the other bacteria found after massage, such as staphylococci, *B.coli,* diphtheroids, etc., though he knows of a case of iritis in which a pure culture of the *B.coli* was isolated from the urine after massage and which was cured without recurrence after suitable treatment. He has not seen a case of gonorrheal iritis in a female.

The author has followed up his cases so far as possible, and with one exception there has not been a recurrence for at least the last five years. In the recurrent case the patient came with an acute iritis and begged for vaccine treatment. He had been four and a half years without recurrence. Examination of the urine after massage showed the presence of many pus cells and a considerable number of gonococci. The man is now undergoing a thorough course of massage and vaccine treatment.

Total, Congenital, Absence of the Chorioid. This practically unique record is made by A. B. Connor.[7]

On Feb. 16, 1918, Corp. C. B., came to the eye department of the Base Hospital at Camp Logan, Texas; complaining that he could not see to get about at night. Recently while on guard duty at night he had failed to recognize and salute an officer. As the bridge where the guards were stationed was over a deep drainage ditch, the soldier feared he would walk off some night and seriously injure himself.

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[7] Amer. Jour. Ophthal., August, 1919.

Vision was tested with the regulation test type and found to be 20/20 in each eye. When told that his vision was normal, he replied, "Oh yes, I can see as well as anyone in the day time, but I can not see as well as other people when it begins to get dark." This condition had existed as long as he could remember, eyes had never been sore and did not trouble him when he went to school. He had formed the habit at home of not going out much at night, unless some relative or friend went with him.

The patient, 25 years old, was a strong, well-developed soldier. Before entering the army he did clerical work without trouble to his eyes. Personal history was negative, not sick since childhood, thinks he had measles when six or seven years old, not very sick and does not think eyes were affected, denies venereal infection.

Parents both living and well, not related. One sister and one brother, living and well, none dead. No other case of night blindness in family that he knew of, and no member of family has any form of eye trouble except one uncle on mother's side who had repeated attacks of sore eyes.

Examination showed lids and conjunctiva normal—pupils equal and responded to light and accommodation, iris normal and dark brown color.

Ophthalmoscopic examination: Cornea, lens and vitreous clear, but the picture presented by the fundus is most striking. Instead of the red fundus reflex usually seen, the examining eye encounters a glistening white fundus over which the larger retinal vessels appear about normal in size and distribution, as shown in Plate VI. The sclerotic is exposed to view over the entire fundus, except a circular area about twice the size of the disc in the macular region. In this macular area the appearance of the fundus is normal, having the normal yellowish red color. The macula shows as a slightly darker spot in about the center of this patch of normal fundus. Scattered about the fundus are a few small ciliary vessels, and a few pigment spots. Both eyes are affected in the same way and present practically the same ophthalmoscopic picture, except that the left macular area is less regular in outline than the right, the latter having chorioidal vessels extending out from it, toward the disc and below.

Although the retinal vessels appear entirely normal the retina itself is not properly developed over the white area, as shown by the markedly contracted, field of vision (Fig. 21) which accounts for the symptom, "night blindness," of which patient complains. The color fields are correspondingly contracted, the red and green having their normal relation. Both eyes are one-half diopter hypermetropic.

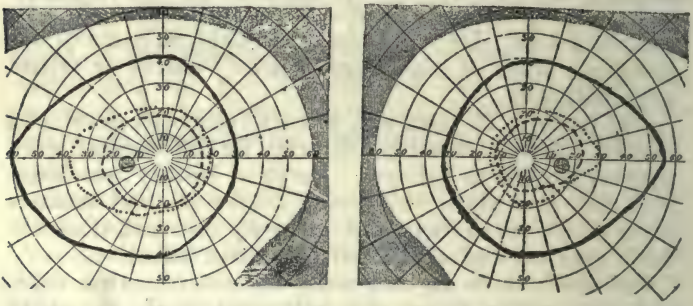

Fig. 21. Boundaries of contracted fields of vision in a case of chorioideremia.

In looking up the literature on anomalies of the chorioid, the writer was able to find only one allusion to this peculiar chorioidal defect recorded—that by the English ophthalmologist, the late Nettleship.

The question naturally arises as to whether this condition called chorioideremia is in reality a condition separate and distinct from the more common defect of the chorioid, coloboma. Is the former dependent upon different etiologic factors, or is it simply an unusual form of coloboma?

Fuchs, in discussing the cause of coloboma, attributes the defects in the chorioid to non-union of the edges of the retinal cleft.

Lang calls attention to the fact that a failure of the retinal cleft to close, would not account for those colobomata which are covered with retina. According to Lang, the explanation of all congenital defects of the chorioid wherever situated, is the same, an adhesion forms between the developing retina and mesoblast, which latter consequently fails to become differentiated into chorioid and sclerotic. If the adhesion occurs before the closure of the retinal cleft, the coloboma is devoid of retinal covering; if it occurs after the retinal cleft has closed the coloboma is covered with retina.

The retinal fissure begins to close at its posterior extremity, the closure extending forward along the under surface of the optic stalk and optic vesicle, until the cleft should be completely closed by the second month of fetal life. This development may be arrested at any stage, hence the shape of the typical coloboma is more or less triangular, situated in the lower segment of the fundus with the apex toward the optic disc, and broadening out as it extends forward toward the ciliary body. It may involve the ciliary body, iris and lens in this region, producing coloboma of these structures as an associated condition.

Whether or not colobomata of the chorioid are due to adhesions between the blastodermic membranes as considered by Lang, it is certainly true that they usually occur along the line of the optic cleft and correspond to the general shape of this cleft during the various stages of its closure, so that we must consider their etiology as at least associated with the development and closure of this fissure.

The exception to this rule is found in those rare forms of coloboma which occur in areas of the fundus, remote from the region of the cleft, of which macular colobomata are examples.

In macular coloboma there is an absence of the chorioid in the region of the macula, while in chorioideremia, just the opposite is found, the macular area being the only part of the fundus which is supplied with chorioid.

From the foregoing it will be seen that the lesion in chorioideremia differs widely in location and extent from coloboma of the chorioid; and it is not unreasonable to suppose that it has a different etiologic foundation.

The analogue in embryonic life of what is later the macular area of the fundus is a spot on the outer surface of the secondary optic vesicle, where the first signs of differentiation of the mesoblast into sclera and chorioid are seen, the first appearance of the chorioid being manifest by a tiny plexus of capillaries at this point. Hence, in seeking an explanation of the cause of chorioideremia, we must consider that differentiation of the mesoblast, of the secondary optic vesicles, into sclerotic and chorioid, began in a normal way and at the normal point, but for some reason was arrested when only the macular area was supplied with chorioid.

Syphiloma of the Chorioid and Ciliary Body. Uhthoff[8] reports the clinical history of a woman, aged 59, with positive Wassermann reaction, who a year before admission was successfully treated for a bilateral specific ocular affections (R. opacities of vitreous, L. iritis), and then came again with violent iritis of right eye. In spite of antispecific treatment a gumma developed at the lower temporal portion of the equator, extending to the limbus, in form of a yellowish grey prominence and leading with severe pain to complete blindness. Ophthalmoscopic view was not possible on account of intra-ocular opacities. Tension normal. Enucleation had to be resorted to. The iris exhibited moderate inflammatory infiltration and posterior synechiae. The chorioid and ciliary body to the root of the iris were uniformly thickened, about 3 mm., and showed gummatous degeneration: Granulation tissue with partly abundant vascularization was found, with incipient transformation into connective tissue, fibrinoplastic inflammation toward the interior in connection with the neoplasm, large necrotic foci, some giant cells, and perivascular inflammatory infiltration within the process and its immediate surroundings.

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[8] Ophthal. Literature, May, 1919.

The affection was very extensive, involving almost the entire temporal half and the lower portions of the eyeball. The gummatous mass protruded through the perforation at the equator to the exterior and interior of the globe, pushing the strata of the sclera, forward and backward. The case was remarkable, as the gummatous process originated from the equatorial portion of the chorioid, the most frequent starting point being the ciliary body. It also belonged to the cases in which an iritis preceded the affection, which in the majority sets in primarily. It was a late symptom of syphilis, associated secondary symptoms being lacking. Also in this respect the case was rare, since syphilomas of the chorioid, and especially the ciliary body, most frequently occur in the first year after infection. The prognosis was unfavorable corresponding to the general clinical experience, that about 64 per cent. of the affected eyes become blind.

THE VITREOUS HUMOR.

Persistent Hyaloid Artery. In a myopic adult with 3/200 vision, Wheeler[9] found in the vitreous a strand which was attached to the optic nerve and extended forward to within about 2 mm. of the lens. It had the characteristic appearance of a complete persistent hyaloid artery. Fine, delicate strands could be seen to radiate from the anterior end. Wheeler believed that originally the strand was attached to the posterior capsule of the lens but that it subsequently became detached owing to the progressively increasing myopia.

Vitreous Hemorrhage. Stieren[10] records the history of a case of spontaneous hemorrhage occurring in a woman with a tuberculous family history. Fourteen years before coming under his observation the visual acuity of the left eye had been practically lost as the result of recurrent attacks. Twelve years after the first attack in the left eye, the right became affected. Owing to

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(9) Archiv. Ophthal., p. 87, 1919.
(10) Penn. Med. Jour., January, 1919.

a direct history of specific infection of the husband the patient had been given intensive treatment. When seen by Stieren, she could count fingers at two feet with the right eye; while but light perception remained in the left. Syphilis, blood dyscrasia, septic and intestinal absorption were ruled out as etiologic factors and under a course of injections of old tuberculin and the local use of galvanism there occurred a progressive improvement resulting in a corrected visual acuity for the right eye of 20/30.

In the use of commercial tuberculin Stieren believes it advisable to begin with from 2 to 5 minims of the strongest dilutions. He also comments on the efficacy of galvanism in promoting the absorption of vitreous hemorrhages and exudates.

THE CRYSTALLINE LENS.

Anterior Lenticonus. An instance of this extremely rare anomaly of the lens is reported by de Schweinitz and Wiener.[1] It occurred in a recruit, aged 20, who was referred because of defective vision which had existed from infancy. It was possible to see him only once. Vision, right eye was 8/200; left eye, 10/200. It was not possible in the brief time at the disposal of the examiners to ascertain whether any spheric or cylindric combination could improve vision. Each lens presented a pronounced anterior cone, which could readily be seen by ordinary daylight, looking through the anterior chamber, especially from the side, and also when the pupils were dilated. During this dilatation it was noted that the lenses were small and slightly hazy, except in the region of the zonula. Fundus examination by the indirect method detected no abnormality. The tip of each cone almost touched the posterior layer of the cornea (Plate VII).

Only two cases of anterior lenticonus have been reported, one by Webster, in which the conicity resembled that of a conical cornea. Without atropine, the lenses raised the vision, in that case from 15/200 to 20/200.

The second case was recorded by Van der Laan under

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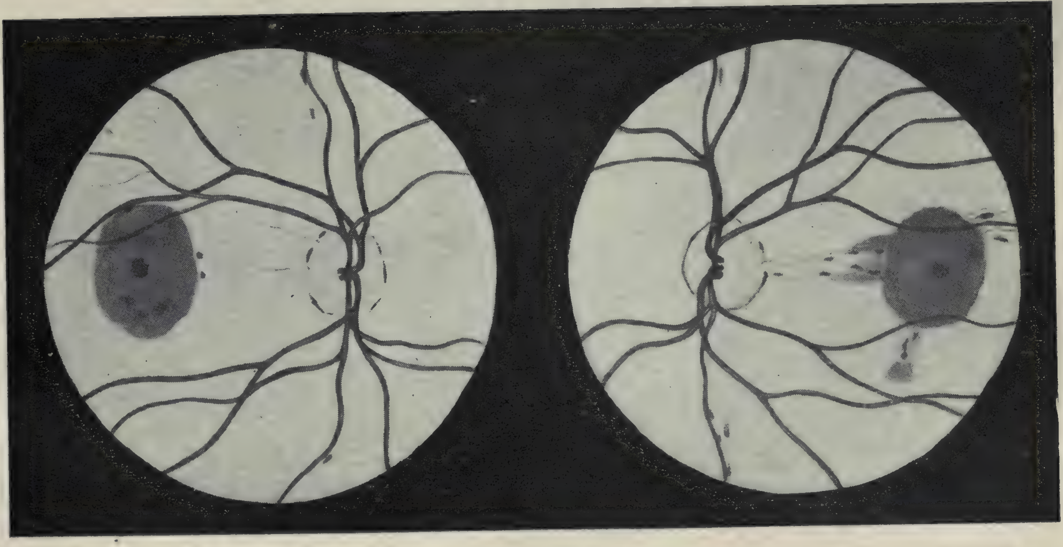
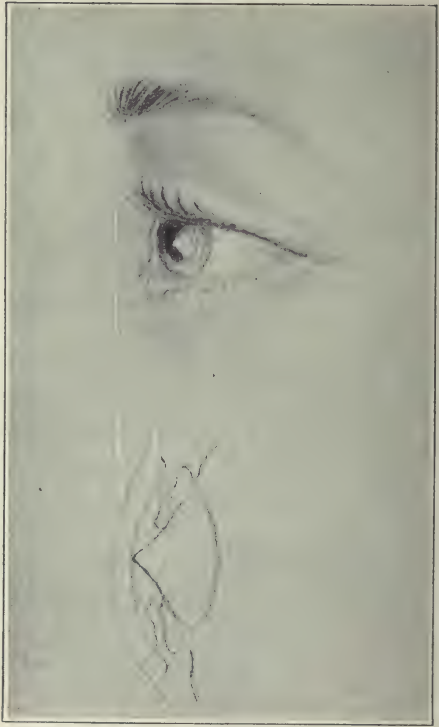
(1) Jour. Amer. Med. Ass'n., Oct. 18, 1919.

PLATE VI.



Chorioideremia. Absence of chorioid over entire fundus except macular region.—Connor, page 82.

PLATE VII.



Anterior lenticonus.—de Schweinitz and Wiener, page 88 the name *anterior polar crystalconus;* the patient was a man aged 23, and the anomaly was said to have developed slowly during eight years. There was a conical protuberance of the lens into the anterior chamber, occasioning through its center a high grade myopia, while through the periphery of the lens the refraction was hyperopic. The cone is said not to have differed in any way from the ordinary lens substance.

[The case of Mohr (1910) showed, in conjunction with an anterior lenticonus, absence of the canal of Schlemm, opacities in the cornea and congenital glaucoma, thus furnishing an example of the rule that even unusual malformations rarely occur alone.—Ed.]

CATARACT.

Experiences and Statistics of Cataract Extraction. The observations of a careful, competent and experienced ophthalmic surgeon on the subject of operations for cataract are invaluable, and for this reason the paper of T. Harrison Butler[2] should be read by every ophthalmologist. He thinks that the success of an operation for extraction of senile cataract is apt to be unfavorably influenced by three classes of complications: those which occur at the operation itself; those that supervene during the healing process; and those which may arise at any period, even years, after a successful operation. Finally, disease of the fundus oculi may cause disappointment to both patient and surgeon. Given reasonable skill, careful attention to details, and even moderately docile patients, few cases should be lost on the table, and when such a tragedy occurs, it is almost always the fault of the patient. In Butler's case, losses in this manner amount to 1.5 per cent. of the total number of operations. He has operated upon many races of mankind, and has no hesitation in saying that the men and women of the English race are by far the most satisfactory subjects for operations on the eye.

The complications of healing account for the large majority of bad results, and these are in the main due

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(2) Brit. Jour. Ophthal., July, 1919.

to the action of toxins either of endogenous or exogenous origin.

The problem of the safe cataract operation will be almost solved when we can eliminate iridocyclitis.

In the later stages of convalescence, a late iridocyclitis or glaucoma may vitiate a successful operation, and still later, infection of the eye through a filtering scar is a complication not unknown. One of Butler's patients lost her eye in this way after enjoying perfect vision for six years. The presence of a fundus lesion which can not be detected before operation is a not uncommon cause of disappointment, for an ideal surgical result will not comfort the patient if sight be absent. Macular changes sometimes appear within a year of operation, and an acuity which has been good gradually fails. The author has noted this more frequently in myopic eyes. Accidents after extraction are not uncommon; he has had several, but fortunately no permanent damage has resulted.

The statistics offered comprise all his cataract extractions up to the end of 1917. They include four years' work at the British Ophthalmic Hospital, Jerusalem; and eleven years in England. The Leamington statistics are not so good, and include four of the total losses, with both cases of panophthalmitis. This may be a mere coincidence, or it may be due to the small number of ophthalmic operations performed, and to the fact that there are no special eye wards, the ophthalmic cases being placed in the general wards. If so, it emphasizes the value of what may be termed an "ophthalmic atmosphere." Patients in ophthalmic wards talk to each other, learn that they have nothing to dread, and enter the operating room with confidence. The statistics also embody all Butler's private cases. The results in these have been very much superior to the others. The majority obtained an acuity of 6/12 or better, and only one case was lost from iridocyclitis. A second developed glaucoma three or four months after operation, and did badly. The acuity at first was 6/9.

The first series of extractions was performed at Jerusalem, and includes sixty-four cases.

The results obtained were as follows: *Normal extractions*—52 = 80.3 per cent.; *lost eyes,* four = 6.5 per cent.

The loss was caused by—panophthalmitis, one; sympathetic cyclitis, one; loss of vitreous, two.

The case of panophthalmitis followed an unsuccessful attempt to extract the lens, which fell into the vitreous and could not be removed with the vectis. The other eye had previously been lost from panophthalmitis after a normal extraction.

The case of sympathetic ophthalmitis left the hospital as a successful result. The last note was "slight injection." Six months later the patient re-appeared with both eyes blind, evidently from sympathetic disease. No patient suffered from iridocyclitis, a complication unknown in the hospital.

Vitreous escaped in eleven cases, a percentage of 17.2 per cent.

Many native and Jewish patients possess no self-control; occasionally they squeeze out the lens in its capsule as soon as the incision is made, and the high percentage of vitreous loss must be put down to this defect.

These figures give an immediate success in 93.5 per cent. and a failure in 6.5 per cent. Butler is unable to give statistics of the actual acuity obtained, because most of the patients were fitted with spherical lenses only, before leaving the hospital, say, at the end of a fortnight. A few patients were followed up and finally provided with accurate correction. The results, however, have some interest, for they can be compared with those claimed in India for the intracapsular operations obtained under very similar conditions. They are almost identical and afford no encouragement to surgeons to select the more difficult and hazardous procedure. The most remarkable feature of the work in Palestine was the entire absence of iridocyclitis. Few of the eyes were clean, most of them had trachoma, no cultures were taken, nor were the lachrymal sacs syringed out before operation. The conclusion is almost irresistible that iridocyclitis after operations on the globe is not due to infection, but to a toxemia of a nature similar to that causing iritis. In Palestine there was practically no primary iritis and no postoperative iritis. In Europe both are common.

English cases number 200 operations upon non-diabetic patients, and ten on diabetics. It is possible that there were a few diabetics among the 200, but if so the fact has not been entered in the notes.

The details of the non-diabetics are presented in the following table:

STATISTICS OF 200 NON-DIABETIC CATARACT OPERATIONS.

Vision	Numbers	Normal Operation	Needled	Vitreous Loss	Prolapsed Iris	Complications
6/4.5	22 11%	19	3	2	0	0
6/6	15 7.5%	15	1	0	1	0
6/9	37 18.5%	36	11	1	3	0
6/12	43 21.5%	42	4	0	1	3
6/18	28 14%	23	10	4	2	3
6/24	18 9%	17	5	1	0	3
6/36	12 6%	11	3	1	0	7
6/60	6 3%	5	4	1	0	4
<6/60	5 2.5%	4	2	0	1	4
Losses	14 7%	12	1	1	0	0
Total	200 100%	184; 92%	44; 22%	*11; 5.5%	8; 4%	24; 12%

The complications in the last column are: Fundus changes, corneal nebulae, and vitreous opacities. Five cases of vitreous loss were vectis extractions.

In two of the successful cases in the list the patients developed glaucoma with gradual loss of vision.

Two suffered from a late iridocyclitis, one after nine months. The operations employed were:

After preliminary iridectomy, 177 cases; combined extraction, 22 cases; simple extraction, one case.

Of these, four were intracapsular extractions which yielded a vision of 6/6 in two and 6/36 in two cases.

Six lenses were removed with the vectis, either because vitreous presented, or because the lens refused to present by pressure. The visions obtained were as follows, "v" indicating loss of vitreous: 6/9, v; 6/12, v; 6/18, v; 6/18, v; 6/18, v; lost, v. Four lenses were extracted under general ether anesthesia because the patient lacked control. All did well.

Late closure of the wound occurred twice, both patients did well, but one patient developed acute glaucoma as soon as the wound closed. It was treated by general depletive measures, rest in bed, and hot applications, and rapidly disappeared.

Slight irido-encleisis, short of prolapse, was noted ten times = 5 per cent.

One of these eyes developed a late infection after six years, and was lost.

Cystoid scar occurred three times.

Mania developed after six operations = 3 per cent.

Iridocyclitis which did not destroy useful vision was present after twelve operations = 6 per cent. If to this figure we add the nine examples which rendered the operation a complete failure, we get twenty-one cases, a percentage of 10.5.

Butler regards the most noteworthy fact in connection with these figures to be the small number of cases needled. Only 22 per cent. of the operations called for this treatment, and only four of the thirty-seven patients who obtained 6/6 or better, a percentage of 10.8. He ascribes his low figure to three circumstances: one is that he *generally performs a preliminary iridectomy;* another, that *he rarely operates until the cataract is mature;* and, last, that if the patient is perfectly satisfied with 6/12 he does not needle to get better acuity.

He lost two eyes after discission, and a third had a narrow escape, and so he never "tempts Providence" if he can avoid it. If one compares the English with the Palestine figures one gets the following, in round numbers:

	England Per Cent.	Palestine Per Cent.
Successful extractions	90	93
Lost eyes	7.5	6.5
Iridocyclitis	10	None
Vitreous loss	5.5	17
Normal operations	90	80

He notes ten *diabetic cases* only, and the results were the following: 6/4.5, one; 6/12, four; 6/18, one; lost, four.

Iridocyclitis was responsible for all the failures. One eye became septic after the preliminary iridectomy. Two eyes in the same patient were lost from iridocyclitis which followed both iridectomy and extraction. The man had previously suffered from diabetic iritis. With the exception of these three cases, Butler has never seen iritis after preliminary iridectomy. A fourth eye developed hemorrhagic iridocyclitis after a needling operation, and was removed.

The most profitable use to be made of such an analysis as Butler has compiled is to study carefully the causes which led to a total loss, or to such poor acuity that the eye was of little value to the patient. These were as follows:

Iridocyclitis	9
Panophthalmitis	2
Hemorrhage	1
Mania and recurrent hemorrhage	1
Dislocated lens	1
	14

Of the cases of iridocyclitis: two followed an operation upon an eye which had yielded a sterile culture. One followed a needling operation, and it was discovered that although the lachrymal sac contained no pus, and the duct was freely patent, a dacryocystitis had been "cured" by probing many years before the extraction. One was associated with a pyorrhea alveolaris, which had been overlooked. Another developed an acute conjunctivitis caught from a patient in the same ward, and iridocyclitis followed. The two cases of panophthalmitis occurred in the same hospital, one in which few extractions are performed. One was infected with *Bacillus subtilis* with a few *Staphylococci albi* and diphtheria bacilli. The second was one of the very few cases in which Butler washed cortical remains out of the anterior chamber with sterile normal saline solution. The patient developed a severe attack of hay fever, and the wound suppurated on the third day.

The case of dislocated lens was in a very bad patient with no control, and the incision was a trifle small. The lens was nearly delivered but slipped back and dislocated upward where it remained out of reach. Chronic iridocyclitis gradually developed, and after some weeks the eye was removed. Had his assistant had a lens hook ready the lens would have been delivered; now Butler never omits to provide him with one.

The causes which reduced the vision under the heading 6/60 and less were as follows: Fundus disease, seven; amblyopia, one; iridocyclitis, one; vitreous loss, one.

If, says the writer, we seek to better our cataract results we must endeavor to reduce the amount of postoperative iridocyclitis, which, if we include the diabetic cases, led to the total loss of thirteen eyes, and reduced the vision in another to 6/60; fourteen eyes in 210 gives a percentage of nearly 7. We can hardly expect to lessen materially the number of the other complications.

"I have come to the conclusion (I admit that it is a dangerous one) that iridocyclitis is not always the effect of an infection from without, and for the following reasons:—

"1. An exactly similar iridocyclitis follows blows on the eye in aged and decrepit persons.

"2. The complication is entirely absent in Palestine in spite of the fact that the eyes there are very often affected with trachoma and chronic conjunctivitis. There, too, the refinements I employ in England seemed unnecessary. In Palestine, as I have already said, iritis is one of the rarest of diseases: in other words, there is not present that tendency to uveal inflammation which we meet here.

"3. If one eye has been affected with postoperative iritis the second eye is likely to suffer in the same way.

"4. Increased stringency in asepsis, the use of cultures, masks, etc., does not seem to have enough influence in reducing the percentage.

"5. The fact that diabetics, who are liable to iritis, are far more likely to suffer from the disease than normal persons. It is absolutely necessary to make the asepsis as strict as possible, and I am quite certain that my most recent methods are followed by more rapid convalescence, and fewer red eyes: but now and then, from no apparent cause, an eye is lost. I now pay great attention to the condition of the teeth, and refuse to operate in the presence of pyorrhoea alveolaris. I think we must study the general state of the patient more than we have done, and with this object I now get the patient into hospital some days before the operation. This affords an opportunity of getting cultures, recording the temperature, pulse, and blood-pressure, and if necessary postponing the extraction till the conditions are more favorable. The practice of preliminary iridectomy is very helpful in this respect, and often gives most valuable information."

Butler thus describes his *usual procedure:* The patient is admitted four or five days before the operation. The general condition is examined, special attention being paid to the teeth and urine. If the mouth be septic, he hands the patient over to the dentist, and waits till he has improved matters. The lachrymal sacs are syringed out, and if pus be present they are excised. A culture on agar or blood serum is made. He operates in the presence of a few colonies of *Staphylococcus albus* or *citreus,* but refuses to do so if *Staphylococcus aureus,* streptococci, or pneumococci grow. He rejects a case which gives a luxuriant growth of any organism, and has the eye treated with protargol and a 1:5,000 solution of oxycyanide of mercury. With this treatment he generally gets a sterile tube. The eye is anesthetized with 4 per cent. solution of cocaine. The eyebrows are shaved, the lashes cut short, and rubbed with tincture of iodine. The eye is washed out with any solution—oxycyanide of mercury 1:10,000, boric lotion, or normal saline. Butler uses a Smith's knife by preference, and makes an ample incision with or without a conjunctival flap as seems most convenient. He prefers to have a flap, but makes no effort to get it if it does not come naturally. He tries to avoid sawing, and with the right hand generally ruptures the capsule with the knife if an iridectomy has been done.

If he is doing a combined operation he first tries a simple extraction, but if there is the slightest call for extra pressure he performs iridectomy. The main objection to the simple method is that it calls for decidedly more and longer pressure than when there is a coloboma. He expresses any cortex which comes easily, but does not fiddle long with it, prefering rather to let it absorb, than to risk vitreous loss. He bandages both eyes for two days, and then instils atropine. If he has personally sterilized the atropine he has no objection to instilling it just before the section and has often done so. He has tried extracting with a fully dilated pupil, but finds that it favors iris incarceration, and has given up the practice. If the eye become injected he finds that the injection of two doses of 10 c.c. of an activated horse serum is very useful, and uses it as a routine treatment. The second injection is given within a week of the first.

The routine study of cultures from the conjunctiva brought out an interesting circumstance. At one time Butler could not get the cases sterile and many of the patients had to be sent home as unfit for immediate operation. The wards had not been properly cleaned owing to the war. As soon as this had been done there were at once clean conjunctivae and the stay of the patients in the hospital was considerably reduced.

The net result of these 250 operations is that 87 per cent. got useful vision, and 50 per cent. 6/12 or better. Sixteen eyes were lost, the majority of them before Butler realized the necessity of removing septic teeth and examining the flora of the conjunctiva.

Finally, one case shows the danger of influenza after eye operations. During an epidemic the house surgeon performed a preliminary iridectomy. The man left the hospital with a white eye. As soon as he got home he contracted a severe attack of influenza and the eye became very painful and inflamed. Fourteen days later he was able to return to the hospital when the eye was found to be in a state of panophthalmitis.

Postoperative Complication. After a preliminary iridectomy, uncomplicated extraction and a needling, one of Knapp's[3] patients returned six weeks later with a *collapsed anterior chamber due to a fine fistula.* Several cauterizations and a conjunctival flap failed to give a permanent result but three weeks later the chamber reformed with the development of glaucomatous symptoms which yielded to miotics. The second case developed after a preliminary iridectomy, extraction with conjunctival bridge and the use of capsule forceps. The chamber remained open three weeks. Later, owing to a rise of tension and the failure of miotics, a posterior sclerotomy was done. This was followed by two trephinings with iridectomies, and two days following the second of these operations there developed an acute iritis with

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(3) Archiv. Ophthal., 1919.

exudation into the anterior chamber. A large iridectomy was then performed followed by a third trephining. A successful result with 0.8 vision was finally obtained.

THE RETINA AND OPTIC NERVE.

Syphilitic Neuroretinitis. As Major Harry Würdemann[4] has said, neuroretinitis syphilitica is a specific inflammation of the optic nerve and the contiguous retina. There can be no neuritis without an implication of the retina, but this in the light cases is confined to the retinal structures in the immediate neighborhood of the disc, and in others is accompanied by a diffuse retinitis. The inflammation extends into the optic nerve behind the globe to a varying degree in each case. Syphilitic retinitis is always accompanied by more or less papillitis; one or the other may be predominant and thus the lesion in each case may be denominated neuritis or papillitis, retinitis, or neuroretinitis.

Choked disc is a papilledema which is restricted to the optic nerve, but not alone to the part observable by the ophthalmoscope—the disc,—for the edema exists behind the eye as well. It is not in itself an inflammation, although in the later stages the infiltration may become so extensive as to cause inflammatory changes; and with this comes extension of the process to the retina, largely from infiltration through the adventitia of the vessel walls. Hence in severe cases of choked disc of long duration, a true papillitis or a true neuroretinitis may be superimposed.

The specific cause of neuroretinitis syphilitica is the local action of the toxins of the spirochete in the optic nerve, causing a true inflammation, with its syndrome of *rubor et tumor (sine dolor);* the latter sign being substituted in the case of the eye by *amblyopia,* for the visual nerve contains no sensitive fibers except those of sight;—hence the ophthalmoscopic findings and the loss of vision. In choked disc, at first there is swelling but no inflammation; and hence the two signs of redness and loss of sensation do not occur, unless secondarily followed

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(4) Amer. Jour. Ophthal., January, 1920.

by inflammation or unless exudation be so great that the nerve fibers themselves become infiltrated,—which is seldom the case,—and hence good vision is frequently present in the early stages.

In inflammation of the optic nerve and retina, there are vascular changes at first, followed by exudation and edema, then infiltration and hemorrhage; later there is proliferation of the mesoblastic tissues of the vessel walls and of the neuroglia; of these the first group are most marked in acute inflammation, the second in the more chronic, but both are invariably present.

Choked disc is in the end only the ophthalmoscopic expression of a general edema of the nerve. The cause is an edema of the dural sheath, leading to a lymph stasis at the optic foramen and a blocking of the lymph streams from the retina, disc and nerve; and this arises from intracranial pressure due to trauma, or inflammatory changes in the membranes of the brain or spinal cord; to actual increase in the cerebral contents by reason of neoplasms in the brain or cord, or to diminution of its caliber by contraction of its walls, as from depressed fractures of the skull or spinal column, or new growths extending inward from the cranial surface or spinal canal.

Ophthalmoscopic signs of neuroretinitis vary with its gravity. At first there may be and usually is, no visual complaint from the patient, and the lesion may be only incidentally discovered. This was so in nearly all the cases found in the soldiers examined during the surveys of syphilitic patients at Camp Lewis. In 460 syphilitics, there were found fourteen cases of optic neuritis, in only four of which had the patient observed any diminution of vision or eye signs; in ten of these (see *colored frontispiece)* paintings were made of the fundus; in the optic nerve cases only the nerve and contiguous area being represented. The Editor has selected five from this series for illustration of this article together with one of true choked disc.

The mildest grade is shown in Fig. 1, case 39: C. E. P., Pvt., Inf. Co. 3, 166 D. B.—Aged 30, Dec. 27, 1918. No complaint of eyes.—Under treatment for syphilis, Ward 13. V. R. 20/20, L. 20/20. Beginning of the lowest grade of optic neuritis. The upper nasal edges of the disc blurred, slight enlargement and tortuosity of veins.—The choroidal ring is pronounced at macular side L. E.

Slightly further advanced is that of Fig. 2, case 37: L. R., Pvt., 31 Co. 166 D. B. Age 26, Dec. 14, 1918. No complaint of eyes. Undergoing specific treatment in Ward 13. V. R. 20/20, L. 20/50. Low grade of optic neuritis most pronounced in left eye.—The major vessels normal but increase of minor on disc, which is slightly swollen and macular edge decidedly blurred. L. E.

A medium stage is that of Fig. 3, case 40: B. P., Pvt. 355, Motor Trans. Corps. Age 22, Dec. 27, 1918. No complaint of eyes. Under treatment for syphilis, Ward 13. A medium degree of swelling of disc with distention, great tortuosity and increase of blood-vessels. The inferior nasal vein is enlarged and slightly sausage form. L. E.

Another medium stage is that of Fig. 4, case 38: J. B., nurse U. S. A. Age 35, Dec. 24, 1918. Mucous patches tonsils and fauces Oct. 24, 1918. Wassermann + +. Undergoing specific treatment Ward 13. Ten salvarsan, Hg. and K. I. None lately. Blurring of vision Dec. 23. V. R. 20/30, L. 20/30. Mild grade neuro-retinitis both eyes. The swelling most pronounced on nasal side. Disc rather pale—no increase of blood-vessels. L. E.

An intense degree is shown in Figure 5, case 41: A. T., Corp. Co. B. 13, Amm. Train. Age 25, Nov. 19, 1918. Noticed two weeks, severe headaches—had chancre in March, 1918, before enlistment, followed by light secondaries. V. R. 20/70, L. 20/40. Wassermann + +. Referred to Ward 13 for specific treatment. A typical picture of inflammatory swelling of the disc of 5 D, with exudate about vessels and in retina. R. E.

Opportunity was afforded in all these patients for further examinations during the course of the specific treatment. One, two and three made full recovery with return to normal of the ophthalmoscopic appearances; and in none of these cases did the author discover any evidence of Thomas' signs. In the fourth case at the last examination, five months after the drawing was made, the discs appeared pale and the blood-vessels somewhat contracted, and the characteristic blurred depression of the optic disc was observed. The fifth patient passed from observation and hence the result in vision and ophthalmoscopic appearance can not be stated.

It is perhaps well to call attention to the great contrast in the ophthalmoscopic findings of neuroretinitis and of true choked disc, which is particularly evidenced in Figure 6, case 42: J. E. G., Cpl. Co. 45, 166 D. B. Age 31, 10, 1918. Fracture of skull about fourteen hours before. Unconscious, in Ward 51. Decompression operation by Major Rockey, 11:00 a. m. Death 7:50 p. m. Pupils slightly dilated, especially left, absence of reflex to light, slight divergence, cadaveric position of eyeballs, edema both discs, veins dilated and tortuous. A typical example of intracranial pressure. R. E.

Here it will be noticed that the optic nerve stands out like a button from the depth of the eye. The swelling here was extremely great, fully 6 D., whereas in the low cases of neuritis there is little or no difference in the refraction of the disc and retina. In the mild grades of neuritis it is true that the normal physiologic cup may be filled in by the edema; but the nerve area is yet a little depressed or at least level with the rest of the fundus. Even in a high grade of neuroretinitis it will be found that the swelling of the nerve scarcely ever exceeds two or three D. Such findings are likewise to be found in optic neuritis from other sources; this occurring in renal disease, diabetes and blood vessel degenerations.

It is the author's opinion that the cause of an optic neuritis is invariably the setting free of some toxin in the optic nerve itself, attended by infiltration and inflammatory changes in the blood-vessel walls extending to the neuroglia, followed by the functional and objective signs. Whereas the cause of edema of the optic nerve, or choked disc, is always mechanical and due to increase of intracranial pressure with a possible exception of pressure on the optic nerve itself within the orbit from trauma or neoplasm, the latter of which he has never observed.

The course of low grades of optic neuritis, from whatever cause, varies from a few weeks to several months and may be followed by complete resolution. In severe types, especially if the systemic origin still obtains, however, these cases go on further and ultimate in more or less grayish atrophy of the optic nerve, in which, owing to the deposit of connective tissue at the edges of the nerve, its periphery always remains somewhat ill defined; in contradistinction to true atrophy, as in tabes or other spinal cord affections, where the edges of the nerve become clear cut, and always in the latter with more or less extinction of sight.

The treatment of optic neuritis is that of its cause. It is generally medication, to eliminate the poison from the system before its local action has caused sufficient inflammatory changes to result in a deposition in, or infiltration of or about the nerve fibers. Thus urgent treatment is indicated;—massive doses of the specific medication. In cases in which the edema of the optic nerve and swelling are great, besides the specific treatment, free diaphoresis by pilocarpine and hot packs, and free purging by alkalines rapidly reduce the local danger of squeezing the nerve fibers from the swelling of their sheaths.

There is no beneficial local treatment. Patients should certainly not subject their eyes to strain, and must protect them from irritating sources of light and heat, by dark glasses or those which cut out the actinic rays of light in large part, as the Noviol or Crookes lenses.

Thus it is in all inflammatory diseases of the eye which are due to syphilis, or in which the latter is a factor, energetic treatment must be given, and to date for this purpose, arsenic and mercury are the most powerful remedies that we possess.

It is believed by Würdemann that the reports of blindness, and especially of cases of optic neuritis from the use of therapeutic doses of arsenic, made some years ago, were improperly promulgated and imperfectly substantiated. Certainly six months observation of the very considerable material seen in the Base Hospital, and from years of private practice, have shown that in therapeutic doses arsenic in the human being has produced no untoward effect on the eye. Further, clinical evidence supports the view, that where cases of inflammation of the retina and the optic nerve arise in syphilis, their course has been hindered by the administration of arsenic; in fact, in all such cases the lesions have melted away leaving little or no trace of inflammatory products or degenerations. No cases of optic nerve atrophy have been observed even where such patients have given histories of many salvarsan injections; one of them having received twenty-seven such, in addition to large doses of mercury and the iodides during several years. It is believed by the writer, and is substantiated by others, that the ocular lesions occurring in syphilis are due to the irritating effects of the toxins of the disease. It may be that in the course of strenuous treatment that the spirochetae may be more or less suddenly released from their local environment, and thereby set up a certain amount of active irritation, which may be seen in the eye as an inflammation of the optic nerve.

Detachment of the Retina. The student of this condition—that presents the most diverse aspects—will find a complete and up-to-date consideration of the subject in the recently issued *American Encyclopedia of Ophthalmology* under the caption, "Detachment of the Retina."

Ernest Thomson,[5] in reviewing the paper of Darier,[6] refers to the history given by the latter of a case of cure of detachment in a myope by the use of puncture associated with injections of acoinated serum gelatine with 6 per cent. sodium chloride, and rest in bed. The case was favorable in so far as it was recent, but unfavorable in that there was a retinal tear. Treatment was instituted in August, 1918, and the retina remained attached at the time of writing. It must be admitted that this is not such a very long time. Ten years have elapsed since Thomson published in the *Ophthalmoscope,* a series of articles entitled, "Detachment of the Retina Reviewed." How far has the treatment advanced since then? Certainly very little, but in the present article Darier seems to have come to certain conclusions as to the best methods on which to rely. Yet his percentage figure of cures seems to remain almost exactly at the figure then ascer-

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(5) Brit. Jour. Ophthal., June, 1919.
(6) La Clinique Ophthal., January, 1919.

tained for all writers on the subject, namely, 10 per cent. To be accurate, Darier says 10 per cent. of cures and 30 per cent. of "ameliorations" in the cases susceptible of cure.

What then are the best means upon which to rely according to Darier? First of all, in the comparatively mild cases of traumatic detachment where the case is seen early, rest in bed, a pressure bandage not too firmly applied, leeches, and, if there has been hemorrhage, pilocarpine or eserine and dionine. If the detachment remains after five or six days, subconjunctival injections of sodium chloride 2 per cent. or 4 per cent. even up to 10 or 20 per cent. In the more serious myopic cases Darier begins with the same treatment and goes on when necessary to retinal puncture. Prolonged dorsal decubitus is necessary, and the patient requires careful watching in this respect. Diaphoresis by pilocarpine or salicylate of soda may be employed. In the presence of a positive Wassermann, general antisyphilitic treatment should be carried out, and the subconjunctival injections may be made with cyanide of mercury, according to the following formula:

Cocaine hydrochloride	0.5
Cyanide of mercury	0.05
Chloride of sodium	2.00
Sterilized water	100.00

One cubic centimeter of this to be injected deeply behind the eyeball every four or five days.

If, on the other hand, there is a tuberculin response the treatment should be directed in this sense. Subconjunctival injections of tuberculin are not to be recommended, though hypodermic injections have given encouraging results in the hands of Dor and von Hippel. Darier himself, however, considers that, as in other cases, the best local treatment is that by injections of sodium chloride or cyanide of mercury.

Detachment of the Retina in Abnormal Pregnancy. In a well-illustrated essay (Plate VIII) on this subject C. A. Clapp[7] points out that while lesions of the eye, extending through all the different tissues from the con-

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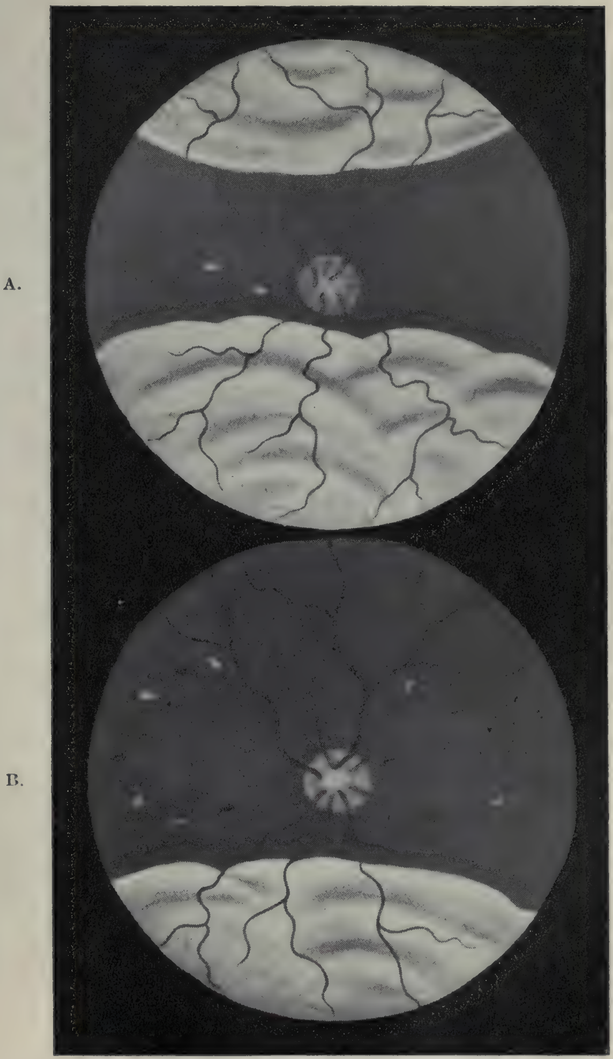
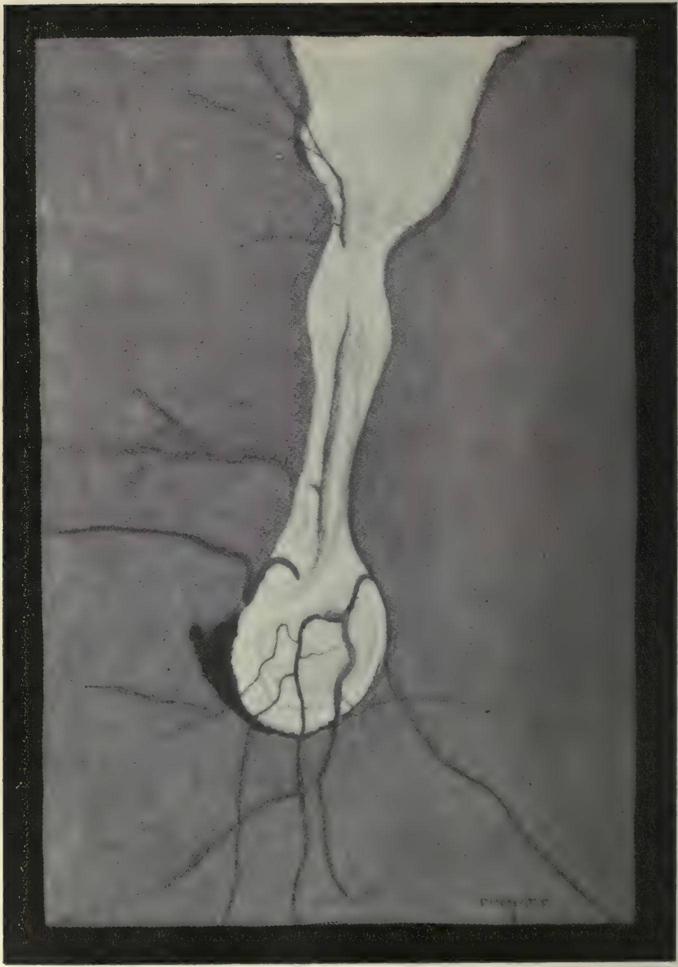
(7) Amer. Jour. Ophthal., July, 1919.

PLATE VIII.



Detachment of retina in toxemia of pregnancy.—Clapp, page 104.

PLATE IX.



Anomaly of fundus.—Finnoff, page 109.

junctiva to the optic nerve, have been reported with more or less frequency in albuminuria of pregnancy and its allied conditions, it is extremely rare to find any mention of detached retina. He also observes that it is claimed by some obstetricians, that cases of toxemia or eclampsia which show eye changes, are always secondary to a kidney lesion.

Detached retinas have been reported in cases of pure nephritis, as Jones cites the case of a man having nephritis with double detachment in each eye, and Batten double detachment in a boy having nephritis.

While one can readily see how in any case of inflammation of the inner coats of the eye associated with edema, one could most easily have this transudation poured out under the retina thus producing a detachment, its infrequency of record in cases of this class is not so easily explained. Many cases of eclampsia show edema of the retina extending from the nerve margins out towards the periphery, without either hemorrhages or exudates. These have been seen with increasing frequency since the introduction of the electric ophthalmoscope and using the direct method of ophthalmoscopy, especially so in those toxemia cases where unconsciousness of patient makes it often exceedingly difficult to make a thorough examination.

Some are now claiming that the unconsciousness is due to cerebral edema, and one can readily see how an edema of the retina starting most frequently with a slight blurring of the optic nerve and extending peripherally could be associated with cerebral edema, and it requires only to carry this pathologic phase one or two steps further to conceive this accumulation in such quantities as to cause separation of the retina from its bed, taking place most frequently in the lower part of the fundus first, and then if the condition is not arrested continuing the separation around the entire circumference. When this stage arrives it would be logical to expect that both serum and blood would find their way outside of the vessels and lymphatics, producing exudates and hemorrhages.

Diagnosis: While the condition as it existed in the author's cases was very definite and if seen could not have been mistaken by even a novice, he is of the opinion that many more cases of detachment occur in eclampsia than are reported and that these occur far in the periphery and are frequently overlooked. Another point which certainly should be kept in mind is a rather frequent examination of these cases, and always with a widely dilated pupil. He also pleads for a very careful painstaking examination, as two of his cases were very difficult of examination with the ophthalmoscope, and as the fundi were studied only after some effort; and in one case was only discovered after careful searching of the periphery. One must also keep in mind the flat detachments, where definite elevation and wrinkling are found but where the fundus reflex is not lost.

Prognosis: Although the appearance is disheartening, and one is likely to give a very grave prognosis as one becomes accustomed to do in idiopathic detachments, here the prognosis depends not so much on the amount of detachment, but on the accompanying neuroretinitis as well as on the length of time that this has existed. The prognosis in reference to the detachment is exceptionally good, as evidenced in this report, but as to ultimate vision it must of necessity be guarded as the neuroretinitis is often followed by marked permanent impairment of the functioning retina.

Treatment. Although eliminating treatment is essential after the condition is well-marked, the most important treatment is prophylactic. In this age of modern medicine when blurring of vision occurs in any stage of pregnancy, and especially in the latter months, there should be a most careful and painstaking fundal examination, and in cases in which neuroretinitis is found, either with or without detachments, certainly from an ophthalmologic standpoint, premature delivery is justified.

While none of the patients in the author's series was treated by spinal puncture, he feels certain that repeated spinal puncture is a procedure that is at least worthy of trial.

As to local treatment he is inclined to the belief that negative is as valuable as positive treatment, and that nearly the entire result depends upon active elimination as outlined by the attending obstetrician.

Retinal detachment in eclampsia is, then, according to most authors, a very rare condition and conspicuous by a paucity of literature. Six such cases have been under Clapp's observation since December, 1917, varying in extent from small to almost complete detachment of the retina. In contradistinction to so-called iodiopathic detachments, these have all subsided and become reattached with normal fields of vision.

They may be antepartum or postpartum, and may clear up in a few hours, and are frequently far forward in the periphery and found only after some searching. They are probably present much more frequently than heretofore recorded, and the prognosis is good so far as the detachment is concerned.

Family Degeneration of the Macula. Four forms of this anomaly are distinguished by Stargardt.[8] They are: (1) Presenile macular degeneration of Tay; light spot in macula in individuals above middle age; (2) honeycomb macular degeneration of Doyne: the honeycomb-like arranged spots in the macula of early youth gradually increase, and irregular pigmentation develops; (3) congenital macular degeneration of Best: is mostly congenital, not progressive and unilateral in one-fourth of the cases; the foci are of different size and form and are always immediately below the macula; (4) progressive macular degeneration with or without psychic disturbance. The affection in this group begins about the twelfth to the fourteenth year in the forms without psychic disturbance, in the sixth or seventh year in those with disturbances. It is a bilateral affection characterized by yellowish-gray spots and irregular pigmentation, ultimately forming foci of 1 to 2 disc diameters. Around the focus and near the disc small light spots appear. In a given family, all members affected are either free of psychic disturbances or all show them. Consanguinity is only one factor in the cases with psychic disturbances.

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(8) Ophthal. Literature, August, 1919.

Clarke[9] reports *familiar macular degeneration* in a boy of 9 years and a girl of 15 years in a family of five children. With both children vision and mental condition began to fail at the age of 7. Both showed in the macula a horizontally oval, dirty gray-yellow area, with fine pigment spots; the surrounding retina had a grayish cast in the boy and appeared atrophic; in the girl it was lighter than the balance of the fundus and looked as if sprinkled with black pepper. The parents were not related. Wassermann of patients and parents negative. Clark thinks that familial macular degeneration with and without dementia are the same disease; consanguinity does not determine which form of the disease will develop. The disease belongs to the class of heredo-degenerations together with retinitis pigmentosa, amaurotic family idiocy, etc. Atypical cases are transitional forms. The cause is unknown. In amaurotic family idiocy the ganglion cells of the retina and of the central nervous system are affected; in maculocerebral degeneration, it is the neuroepithelium of the retina.

[When one considers the fatal, progressive character of the great majority of cases of Tay-Sachs disease the conclusion is inevitable that the eye signs form but one and (in a sense) a minor feature of the disease. The condition is probably one of what used to be called "defective metabolism" and is undoubtedly an instance of endocrinic or similar vice.—Ed.]

Etiology of Leber's Disease—Hereditary Optic Atrophy. Zentmayer[1] describes a number of cases in two families, A and B. In the first (A) there were four children, of whom three were alive and two of them affected with hereditary atrophy of the optic nerve. In the first patient, who was affected at thirty years of age, the pituitary fossa was, according to an *x*-ray examination by Dr. Henry K. Pancoast, 13 mm. in an antero-posterior direction by 12 mm. in depth. In the second patient, affected at twenty-nine years of age, the cure of nasal polypi and purulent ethmoiditis failed to arrest the progressive loss of vision. The fossa measured 10 mm. by 11 mm., *i. e.,* was on the border-

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(9) Ophthal. Literature, August, 1919.
(1) Trans. Amer. Ophthal. Soc., p. 6, vol. xvi.

line of the normal. In the second family (B) there were nine children, namely, five males and four females. Of these the first and seventh child, both males, were affected, while the third, a female, showed symptoms suggestive of incipient pituitary disease. In the first affected the pituitary fossa measured 12 mm. by 10 mm. In the second the fossa was 13 mm. by 12 mm. Two unaffected members of the family were submitted to *x*-ray examination. The pituitary fossa in the first was 9 mm. by 9 mm., and in the second 12 mm. by 10 mm. In the latter, vision was normal, but the left papilla was obscured and slightly prominent; the visual fields were concentrically contracted for form and color; and a minute central relative scotoma was present in the right field.

Zentmayer concludes that, while his observations are in no way conclusive, his results are sufficiently uniform to merit attention. The normal pituitary fossa varies greatly in size and often oversteps the limits set as maximum normal, while our present knowledge of heredity in connection with disorders of the pituitary body is too vague to permit of assertive statements.

Anomalous Condition of the Fundus Oculi. Wm. C. Finnoff[2] has described and pictured (Plate IX) a remarkable, probably congenital, anomaly of the ocular background in a man, aged 20. He reports that the patient had always enjoyed good health and believed his eyes to be normal, except for a slight divergent squint, until six years ago when he had tonsilitis. While he was under a general anesthetic for the removal of tonsils, some ether was accidentally dropped into the right eye which produced some irritation and called his attention to this eye. At this time he discovered that he could see very little with it, and believed that the loss of vision was due to the ether.

The patient consulted Finnoff, May 24, 1919, to learn the cause of his unilateral blindness, and to see if his divergent squint could be corrected. His vision with the right eye was 0.03, left 1.4. With the ophthalmoscope the media were found to be clear. Only the lower 2/3 of the disc could be made out, and to the temporal

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(2) Amer. Jour. Ophthal., March, 1920.

and lower side of it a white scleral crescent 1/3 disc diameter could be seen. The crescent is bordered with a band of pigment which is thinnest on the nasal side, and thickens out to 1/3 disc diameter on the temporal side. A veil-like membrane is noted beginning on the disc and covering the upper 1/3 of it. This structure runs upward and slightly to the nasal side, is funnel shaped, and the front part rapidly comes forward into the vitreous until it is best seen with a +8. D. lens. The base of the funnel flattens, is quite far in front of the equator, and is bordered by a thin band of pigment. On the surface of the funnel, beginning at the disc, a greenish glistening fold can be seen farther forward in the vitreous, which later blends with the main mass as it comes forward at the junction of the middle with its upper third. To the temporal side and at the base of this fold a portion of the upper temporal vein can be seen.

The distribution of the retinal vessels is anomalous also. The retinal artery makes its appearance to the nasal side of the disc opposite the beginning of the membranous fold and divides into three branches. One branch runs upward along the edge of the fold for a short distance and disappears under it. Another branch courses downward and to the nasal side and constitutes the lower nasal artery. The third branch takes a tortuous course across the upper portion of the disc for about two-thirds of its diameter, then bends acutely and runs downward, giving off small branches in its course along the disc. This branch corresponds to the lower temporal artery. Another artery, which supplies the upper temporal region of the fundus, is first seen emerging from the membrane which covers the disc. It passes over the temporal half of the membrane and dips down over its edge in reaching the retina, after which it passes normally to the upper temporal portion of the fundus.

One large vein is seen entering the disc. It is made up of three branches, two from the lower nasal quadrant, and one from the lower temporal. It passes over the disc and just before disappearing into the nerve head hooks over the artery. A second vein passes through the veil-like membrane and receives branches from the upper temporal quadrant.

Because of the peculiar disc and the unusual arrangement of the retinal vessels, Finnoff believes the anomaly to be a congenital condition. A retinitis proliferans in this region would not be accompanied with an absence of retinal vessels in the upper nasal quadrant of the fundus. The anomalous position of the vessels also is very suggestive of a development defect.

Congenital Fundus Anomalies. A large number of these were discovered in the examination of our registrant draftees during the World War. Major A. B. Middleton[3] has described and painted a number of these (affecting vision) found in more than two hundred thousand troops examined at Camp Travis, Texas, before the armistice was signed. Out of the eye cases referred to the Special Medical Examining Board, twenty-eighth had a congenital condition of the fundus or bulb causing a reduction of vision.

The cases were carefully sketched and the congenital defect painted in corresponding shades, like the water color drawing accompanying each history and description. The small number of congenital conditions affecting the bulb and fundus sufficient to reduce vision, taken from a large number of young men in the prime of life must not be misleading and give the impression that congenital eye changes are rarely met in civil life.

Case 3. Opaque tissue on the optic disc. Private S. H. E., April 5, 1918. Claims to have had syphilis early in life, but no symptoms or indications that the disease ever existed. Discharged from the army Dec. 6, 1917 (second draft), for beginning optic atrophy. During first induction this soldier malingered with regard to his eyes, pains in the body and several ailments, which he claimed were the result of syphilis early in life. After being in the hospital and held under observation for several weeks, was returned to his company. He was discharged from the army for beginning optic atrophy, and returned home, the local board reinducting him with the seventh increment. The same tactics were followed in order to avoid the army on the second induction,

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(3) Amer. Jour. Ophthal., June, 1919.

stimulated with a recent discharge from the army due to optic atrophy. The supposed optic atrophy on a careful examination proved to be a bilateral congenital condition of each disc. The eyes never gave trouble in civil life.

Examination. Tension normal, vision O. D., 20/30; O. S. 20/20. Fields normal; each cornea clear and free from scars. Anterior chambers deep. Aqueous clear. Iris free from adhesions and pigment deposit. Pupils equal and normal in size, reacting normally to light and accommodation. Power of convergence normal; vitreous clear and not fluid. Vessels normal. No chorioditis. Lens clear. No change at the macular region. Discs normal in size but bulging resembling a pseudo-papillitis. The nasal half of each disc shows ten or twelve elevated circular areas 2 mm. each in diameter, giving the appearance of a white blackberry; these nodules do not extend farther than the margin of the superior and inferior retinal vessels as they pass over the disc, the temporal half of each disc being smooth, but bulging. The discs give a very white appearance, the nasal half with its opaque tissue confined to the disc, resembling in color an advanced case of optic atrophy. No pigment in or near the disc. The white elevated areas are confined to the disc and do not show the usual signs found in cases of exudative deposits. Fields normal.

Case 4. Congenital pigment in physiologic cup. Private C. M., July 5, 1918. Poor vision in left eye all of life. The eye has not given one moment's trouble other than reduction in vision. Had not had the eye examined by a physician before entering the army. All members of family have good eyes. No specific history.

Examination. White: single; tension normal. No squint. Vision, O. D. 20/20; O. S. 10/200. Cornea of left eye clear and free from scars. Anterior chamber deep. Aqueous clear. Iris free from adhesions and deposit of pigment. Pupil slightly dilated, reacting slowly to light and accommodation. Power of convergence reduced. Normal field of vision. Lens clear. Vitreous clear and not fluid. Vessels normal. No chorioiditis or chorioidal rupture. Disc normal in size and color. On the temporal side of the physiologic cup in the left disc is a densely pigmented triangular area; each side of the triangle equals one-third of disc diameter in length. The pigmented area does not extend beyond the margin of the physiologic cup, but stops abruptly at its temporal margin. The densely pigmented area extends to the bottom of the physiologic cup. One apex of the pigmented triangle ends at the bottom of the cup, at the point where the central vessels enter the nerve trunk. The pigmented area is not elevated or nodular, but smooth and flat. No vascular disturbance near the pigmented area. No signs of a growth, such as a melanotic condition might present. Cilioretinal vessels pass through the pigmented area, which is nothing more than a congenital pigment deposit on the temporal side of the physiologic cup (Plate X—4).

Case 6. Congenital pigmentation left macular region. Private C. M. W., May 24, 1918. Age 23; occupation, farmer; single; white; left eye weak all of life; never had it treated or examined by a doctor; the eye has not given the patient any trouble other than dimness of vision. Denies specific history. No blindness or poor eyes in family. No history of a blow to the eye.

Examination. No squint. Tension normal. Vision O. D. 20/30; O. S. 3/200. Left cornea clear and free from scars. Anterior chamber deep; aqueous clear. Iris free from adhesions and deposit of pigment. Lens normal. Vitreous clear and not fluid. Vessels normal. Disc normal in size and shape. At the macular region there is a densely pigmented circular area three-fourths the disc diameter in width. The surface of the area is smooth, but mottled with very small whitish streaks, 0.5 mm. each in width. The white streaks are not exudative but simply unpigmented retina showing between the heavily pigmented portion. Branches of the retinal vessels extending to the margin of the pigmented area pass over the pigment. Large central scotoma. Pupil reacts to light and accommodation slowly. Power of convergence normal. No chorioiditis or rupture of the chorioid. No pigment deposits other than the area at the macula (Plate X—6).

Case 11. Fold in the Retina. Private M. P. (Mex.), June 26, 1918. Denies specific history; has not had a blow on the eye. Right eye has been weaker than the left all his life, but never had it examined or treated by a doctor. The eye has not given the slightest trouble other than reduced vision.

Examination. No squint; tension normal; cornea clear and free from scars. Anterior chamber deep. Aqueous clear. Iris free from adhesions and deposit of pigment. Lens normal. Vitreous clear and not fluid. Vessels normal in shape and position. Disc normal in size and color. At the macular region there is a circular area of granular chorioiditis of a dark red color one half the disc diameter in width. In the granular area are many small pigment specks one millimeter each in diameter, giving a mottled appearance. Above the center of the macula are two densely pigmented circular spots 2 mm. (apparent size) each in diameter, on the same level horizontally 3 mm. apart with no evidence of exudate. On the nasal side of the disc is a distinct fold in the retina, 2 mm. (apparent) from the margin of the disc and 2 mm. wide extending vertically toward and parallel with the nasal margin of the disc. The fold is a light gray color, free from pigment deposit along its margins, such as is present in most cases of chorioidal rupture. The retinal vessels leaving the nasal side of the disc pass over the retinal fold at right angles, bending forward as they pass across the folded retina. No rupture of the chorioid. No deposit of pigment or signs of hemorrhage at the site of the fold. Field of vision not taken (Plate X—11).

Case 14. Ectasia of Sclera. Private J. L., (Col.), July 18, 1918. Specific history two years; has been blind in the right eye all his life, but it has never given the slightest trouble except the dimness of vision. The eye has never been hit a hard blow; or been red and inflamed. An external strabismus of twenty degrees present that has existed since childhood.

Examination. Vision O. D. 1/200; O. S. 20/20. Tension normal. External squint 20 degrees. Right cornea clear and free from scars. Anterior chamber deep. Aqueous clear. Iris free from pigment deposit and adhesions. Pupil dilated, reacting slightly to light, but not to accommodation. No power of convergence. Lens normal. Vitreous clear and not fluid. Disc normal in shape and color. Vessels normal. Field not taken, acuity of vision too low. Below the macular area in the right eye is an elliptical shaped depression in the sclera three diopters deep. The hole is one and one-half disc diameter in length, and three-fourths of one disc diameter in width. The axis of the ellipse is up and in, toward the disc, at about the angle of eight o'clock. The retina dips down into and covers the bottom of the scleral opening, which is larger at the bottom than at the opening through the chorioid. The retinal vessels pass down over the edge of the sclera into the scleral ectasia, disappearing the same as in the case of a glaucoma cup, appearing again, crossing the bottom of the hole, making the same turns in their exit. Many small retinal vessels pass down over the margin of the hole, which is not sharp cut but rounded. There is no chorioid in the depression, the chorioid is very thin over the margin of the hole. The retina is considerably pigmented over the floor of the hole, but is not pigmented over the balance of the fundus. The temporal end of the hole contains a deposit of exudate and two deeply pigmented spots resembling apple seeds. Over them, extending from above, is a fan-like exudate covered with blood-vessels. The handle end of the fan extends down into the hole, between the two apple-seed-like pigment deposits, attaching itself to the floor. The exudate and pigment deposit in the temporal end of the hole is the result of a specific chorioiditis that has taken place in the congenital opening in the sclera (Plate X—14).

THE OCULAR MUSCLES.

Correction of Muscular Anomalies. A timely paper on this subject is contributed by Samuel Theobald.[4] He notes, in particular, the disposition on the part of so many ophthalmologists to underestimate the importance of the muscular faults of the eyes and to center their attention on the faults of refraction; and believes this

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(4) Jour. Amer. Med. Ass'n., June 21, 1919.

to be due chiefly to the fact that muscular imbalance is not infrequently largely, and sometimes wholly, dependent on errors of refraction, and is lessened or may be entirely done away with when these errors are corrected by suitable lenses. This circumstance, indeed, has led certain extremists to deny the existence of "muscular asthenopia," and to contend that this condition is, in all cases, due to a refractive fault, and is eliminated by the correction of this fault. And, it may be added, there are also extremists—very few, it is true—who hold exactly the opposite view, who insist that muscular imbalance is in nowise dependent on anomalies of refraction—manifestly a still more bizarre conception.

While the views of the extremists do not deserve serious consideration, it has seemed to Theobald worth while to utter a word of warning against the present trend of ophthalmic practitioners to belittle the importance of these latent anomalies of the ocular muscles.

As on a previous occasion he says, that "although heterophoric conditions, because less common, are not so frequent a cause of asthenopia as are errors of refraction, they are quite as capable of producing the manifold symptoms, local and remote, which we have learned to attribute to eyestrain." And further, that "while it is true refractive errors, when present, markedly influence . . . muscular faults, there are muscular faults . . . which are in no sense dependent upon ametropia, and which are just as real as ametropia itself."

It is his conviction that unless the ophthalmologist in every case of asthenopia determines the muscle balance, he does not do justice either to his patient or to himself, and this determination of the muscle balance should be made not only for distant vision, but for near vision as well.

To one unaccustomed to making these tests, or to one who has been in the habit of employing the cumbersome and unnecessary apparatus used by many in making them, this may seem a hardship; but, as a matter of fact, only a few moments are required to obtain the information desired. A candle flame or a small electric light at 20 feet, a prism—by preference in most instances one of 4 degrees—taken from the trial case and held vertically before the eye, and a multiple Maddox rod enable one, with very little expenditure of time, to measure with exactness the lateral and vertical muscle balance for distant vision; while a prism of 7 degrees, to induce vertical diplopia, and an asterisk printed on a card, to encourage accurate accommodation, as a test object, will enable one—with the aid, of course, of lenses taken from the trial case—to determine almost as quickly the lateral muscle balance at the reading distance, while the Maddox rod, supplemented by the invaluable Schild's pinhole light, will give the vertical muscle balance for near vision. He would waste no time in trying to discover how strong a prism, held with its base horizontal, the external or internal rectus muscles are able to overcome, as he long since reached the conclusion that this is a question of *knack* rather than a trustworthy determination of the relative strength of these muscles.

While these muscle tests should be made at the outset of the examination, because the findings are less trustworthy after the eyes become fatigued, and because, moreover, they afford an important indication as to the glasses which should be prescribed for the correction of any refractive fault that may be present, they should of course be repeated later with any such fault carefully corrected.

How one should deal with heterophoria depends in large measure on whether the condition is due to an *actual* fault of the muscles themselves, or whether the muscle fault is only apparent, that is to say, is solely or chiefly caused by an error in the refraction of the eyes. In the latter case, correction of the anomaly of refraction may be relied on to eliminate the muscular imbalance. In the former case, prismatic glasses are indicated if the imbalance is not marked, and one or more tenotomies or, as some prefer, an advancement or a tucking operation, if the muscle fault is more considerable.

Refractive errors, it may be remarked, though they radically influence esophoria and exophoria, have little influence on hyperphoria, except that pronounced anisometropia tends to favor its development, as, indeed, it does that of both vertical and lateral squint, because in this condition the stimulus to binocular fixation is always lessened and not infrequently entirely abolished.

Not so very rarely he has encountered hyperphoria which was present in near vision and absent in distant vision, and in other instances the conditions have been reversed—hyperphoria in distant vision and vertical orthophoria in near.

Of great practical importance is the fact that unless the muscle balance at the reading distance is known, the existence of subnormal accommodative power—the muscle fault which, in his experience, is oftenest overlooked—cannot be recognized. The detection and correction of this anomaly is, in many cases, so helpful that if nothing else were gained by the near muscle-balance tests, this alone would fully repay the time and trouble involved in making them.

Measurement of Squint by a Modification of the Priestley Smith Method. W. F. Holzer[5] points out that an important and yet often neglected step in the estimation of a squint is a regard for the *angle gamma*, or *angle kappa* of Landolt. The Priestley Smith tape method as described by Worth accounts for the angle, without the necessary separate determination, and addition if positive to convergent and deduction from divergent squints; and *vice versa* if negative. Worth says in part: "The patient is first told to fix the mirror, while the light of a lamp is reflected into the fixing eye. The position of the image of the mirror, on the cornea of the fixing eye, is noted. The light from the mirror is now thrown on to the deviating eye, and the patient is directed to look at the surgeon's tape hand. This is moved horizontally, till the position of the image of the mirror on the cornea of the squinting eye, is similar to that which it formerly occupied on the cornea of the fixing eye." Practically every other description of the method of application directs the image of the mirror to be placed in the centre of the cornea, which corresponds to the optic axis of the eye; thereby disregarding the angle gamma.

Two criticisms are apt to arise: first, of the deviation when fixing at six meters compared with fixing at one

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(5) Amer. Jour. Ophthal., July, 1919.

meter or at sixty centimeters (length of the latter tape); and, second, of the error due to measurement on the chord of the arc as compared with measurement on the arc. Maxwell demonstrated that the angle measured at twenty-five centimeters (less than the length of the tape) averaged 2.1 degrees greater than at six meters. The "mathematical error" (the difference between an angle measured on the arc of a circle and the chord of the arc) is so small as to be practically negligible. On the other hand the "observation error" (the inability of the observer to place exactly in a corresponding situation on the deviating eye the position, centric or eccentric of the corneal image in the fixing eye) is common to most methods of measuring deviations, the degree of accuracy depending upon the skill of the individual observer.

The writer has made a slight addition to the Priestley Smith tape, very simple but which he deems quite important; never having seen it noted. It is the addition of a "constant radius," by means of a tape from the ring, held by the patient against the cheek, to the hand of the observer which slides along the graduated tape, maintaining a constant radius.

A cloth or steel tape graduated in centimeters, two pieces of half-inch cloth tape, measuring with rings attached sixty centimeters, and three one-inch steel or nickel rings, one to three sixteenths of an inch thick, constitute the necessary materials for the tape.

The accompanying diagram (Fig. 22) illustrates the position of the tape in the measurement of a concomitant squint of 45 degrees. To A (ring held by patient against cheek) is attached tape A B and ring B (through which ophthalmoscope handle is placed). B C represents the tape graduated in centimetres (1 cm. = 1 degree) attached to ring B and passed through ring C. The tape A C is the writer's addition. Being the same length as A B it maintains a constant radius as the hand slides along the graduated tape passing through ring C. B C represents the chord of an arc of a circle whose radii are A B and A C.

The determination of deviation is made by the Priestley Smith method. Let us take for example a convergent squint of the left eye. Measurements should be made in a dark room with a lamp situated behind the patient. The ring A is held against the right cheek, below the fixing eye, by the patient. An ophthalmoscope or retinoscope handle is passed through ring B and held in the observer's left hand. The image of the light behind the patient is now reflected from the mirror of the ophthalmoscope or retinoscope into the fixing eye, and the patient is directed to fix the mirror. Through the sight-hole in the mirror the observer notes the exact position of the corneal image. He now turns the mirror to the left eye; the patient still fixing the mirror with the right eye, and notes that the image on the left cornea is situated eccentrically outward, showing that this eye deviates inwards. He now directs the patient to follow, with his fixing eye, a finger of the observer's right hand over which ring C has been placed. The right hand is

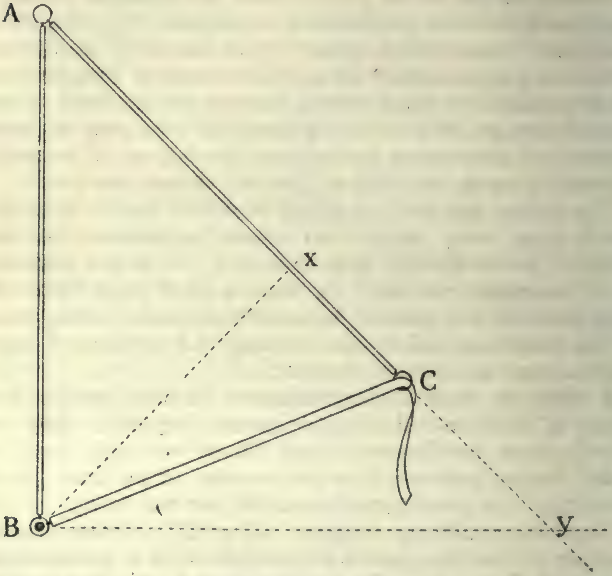
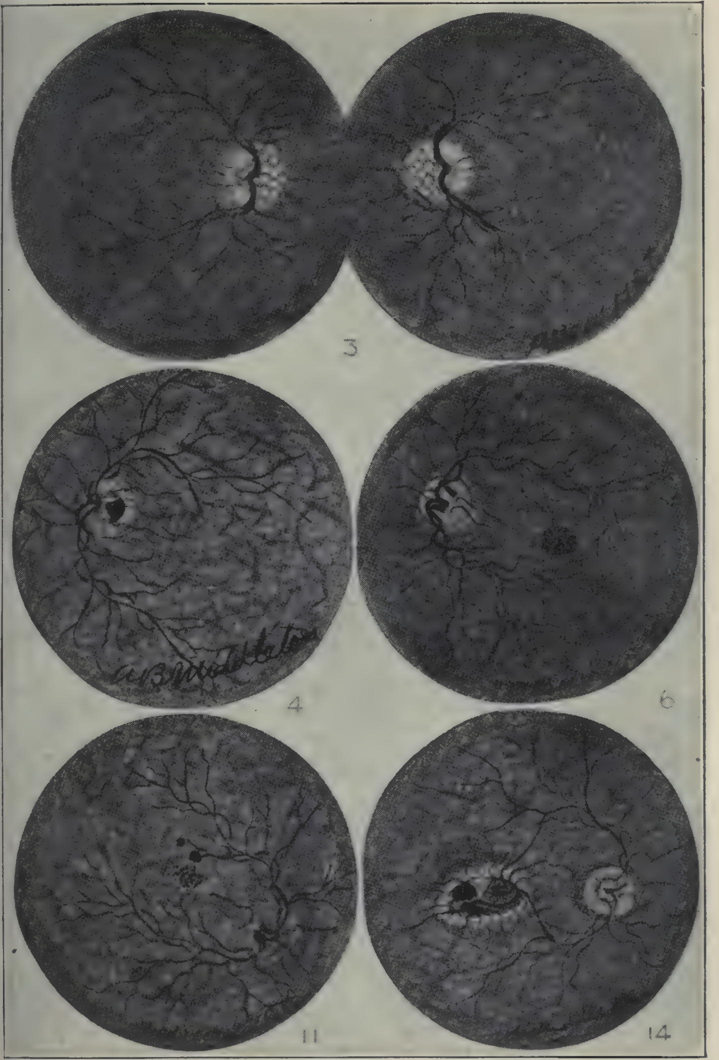


Fig. 22. Position of tapes in determining squint of 45 degrees, showing advantage of additional tape AC (Holzer); which prevents errors from holding tape BC too near patient (X) or too far away (Y).



Congenital eye conditions.—Middleton, page 111.
(The numbers refer to number of case.)

gradually moved horizontally outward along the tape B C while the observer notes the changing position of the corneal image through the sight-hole of the mirror, until the left eye has rotated outward enough to bring the image to the *corresponding situation* occupied in the fellow eye (right) when that eye was fixing the mirror. When this point is reached he pinches the tape and reads off the degree of deviation; one centimeter on the tape equalling one degree of deviation.

The same position of the hands and tape can be employed in measuring a divergent squint of the right eye, with the left eye fixing. To measure a convergent squint of the right eye or a divergent squint of the left eye the principle is the same but the hands and tape are reversed. The tape can be held taut between the ring and the finger, obviating the necessity of the weight usually mentioned.

The diagram illustrates at a glance the "constant radius" maintained by the writer's additional tape A C. It presents graphically the advantage of the tape in avoiding errors by faulty position of the distal end (C) of the graduated tape B C. A reading made with the tape in the Bx position would be less than that made at B C, because the distance between the patient and the end of the tape at x is less than 60 cm. With the tape occupying the position By, the reading will be greater than that made at B C, since the distance from the patient and the distal end of the tape at y is greater than 60 cm.

This method is applicable to almost every case. Parsons says: "This test is by far the best for small children of any yet devised." It is almost a purely objective test, accurate, rapid and simple. The tape is compact, portable and inexpensive.

Oculogyration. This word, new in English terminology, is defined by W. G. Spiller,[6] who remarks that the French term *oculogyre* and its modifications have no English equivalents and that a "gyre" might mean either a *gyration* or a *gyrus,* as one of the convolutions of the brain. Gyration, however, means the "act of turning, as a body on its axis of rotation, while simulta-

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(6) Amer. Jour. Med. Sci., May, 1919.

neously whirling about an axis of revolution,'' and it seems better adapted to the translation than *gyre*. Spiller also employs the terms *dextrogyration* and *sinistrogyration* to mean right lateral associated movement of the eyeballs and left lateral associated movement, respectively. He discusses certain aspects of oculogyration and distinguishes clinically between lesions above and below the nucleus of the branch of the oculomotor nerve supplying the internal rectus muscle, causing disturbance of lateral associated ocular movement; also from this standpoint he explains the lesion causing complete bilateral ophthalmoplegia in a way not hitherto employed in literature. A lesion at a considerable distance above the oculomotor nucleus probably could not cause persistent paralysis of ocular movements, as such movements are bilaterally represented in the cerebral cortex.

Paralysis of upward associated movement indicates a lesion near the corpora quadrigemina. There is evidently a lesion in this man in or near the corpora quadrigemina, causing paralysis of upward associated movement, marked paralysis but not complete of dexterogyration and slighter paralysis of sinistrogyration; and yet he presents no incoördination of the limbs, as one might expect, from disorder of the superior cerebellar peduncles. The lesion can not be large enough to cause implication of these structures.

Were his condition associated with hemiplegia the symptom-complex would be what the French writers call the *syndrome of Foville*.

A case of paralysis of *oculogyration* on the side opposite to the hemiplegia was reported by Drs. Potts and Spiller from a tubercle of the pons, and this heterolateral paralysis is indicative of a lesion of the pons; for example, paralysis of dextrogyration with eyes turned to the left associated with left hemiplegia indicates a lesion of the right side of the pons. It means that a lesion of the connecting fibers of the nucleus of the nerve to the internal rectus of one eye with the nucleus of the opposite abducens nerve has occurred, and usually near the abducens nucleus. In this form the function of the affected internal rectus muscle may be preserved in convergence, indicating that the nucleus of the nerve to this internal rectus and its cortical connection can not be destroyed.

Spiller believes that when the central pathway of corticonuclear oculogyration is paralyzed above or in the nucleus of the nerve to the affected internal rectus the function of this muscle in convergence will disappear or become much impaired. When the break occurs in these fibers above this nucleus no impulses can pass into this nucleus for either form of function of the internal rectus, *i. e.,* for oculogyration or for convergence; but when the break occurs in the posterior longitudinal bundle, and therefore below the nucleus of the nerve to the internal rectus, the function of the internal rectus muscle in convergence may be preserved, as it has no relation to the abducens nerve, but oculogyration demanding the function of this muscle in association with the function of the heterolateral external rectus will be lost. This diagnostic distinction of a lesion above the nucleus of the nerve to the internal rectus as compared with one in the posterior longitudinal bundle below this nucleus as of value in localization, has not been described, and it applies to the lesion above the nucleus only when it is near the nucleus.

As the patient in this case has paralysis of upward associated movement with paralysis of dextrogyration and paresis of sinistrogyration, and still less power of the left internal rectus in convergence than in the associated movement of this muscle with the right external rectus, he probably has a lesion of the corpora quadrigemina, and not one on the base involving the nerves at their exit.

It is not necessary to assume that the paralysis of the right external rectus muscle in this case is caused by a lesion of the abducens nerve or its nucleus. Complete ophthalmoplegia implicating all the nerves supplying the eyeballs has been explained usually as the result of inflammatory lesions of all the ocular nuclei, but this explanation, when all other cranial nerves entirely escape, has seemed to me unsatisfactory, especially as bilateral complete ophthalmoplegia has been repeatedly observed without other nerve lesions. When a lesion destroys the nuclei of the trochlearis and oculomotorius nerves bilaterally, which a comparatively small lesion may readily do, as these nuclei are very near together, it must destroy the connections in the posterior longitudinal bundles between the nuclei of the internal recti and those of the external recti, and consequently paralysis of the external recti muscles will result without any lesion of the abducens nerves or their nuclei. The movements of the two eyeballs are intimately associated and a lesion of the central pathway of corticonuclear oculogyration near the nuclei affects the movements of both eyeballs.

T. B. Holloway made the following report on the eye conditions: "The patient was seen April 15, and I found that since his last observation the vision of his left eye had deteriorated considerably and is now but 3/150. The other conditions were as follows:

"The veins of the upper lid of the left eye are more prominent than those of the right. There is a ptosis of the left upper lid, the palpebral fissure measuring 6 mm. in contrast to 10.5 mm. for the fellow eye. The left eye is distinctly proptosed and displaced downward 2.5 mm. and outward 1 mm. Hertel's exophthalmometer shows the apex of the left cornea to be 3.5 mm. more than the right. There is decided resistance to backward displacement of the globe. No visible or palpable pulsation is present. I did not have a stethoscope to listen for a bruit. Palpation of the anterior portion of the orbit reveals a distinct fulness at the upper and inner angle. The caruncle and plica are reddened and prominent."

Holloway found that on rotation of the globes to the right there is a decided restriction of movements, the right eye rotating outward and the left inward not more than 10 degrees. Upon rotation to the left the left eye rotates to within 2 mm. of the external canthus, while the rotation inward of the right eye is hardly as great. The upward rotation is restricted in both eyes, but distinctly more so in the left. There is slight downward restriction of both eyes. Upon attempts to converge, the left eye practically fails and soon deviates outward.

The right pupil measures 4.5 mm., is distinctly eccentric and is displaced upward and slightly inward; the position of the left pupil is normal and it measures 3 mm. There is no direct or indirect pupillary light reflex in the right eye, but in the left there is a slight direct and greater indirect light reflex. Both pupils react slightly upon attempts at convergence and accommodation.

The media are clear, the disks are not pathologic and there are no fundus changes aside from slight increase of the arterial reflex and some venous pressure signs, due to incipient sclerosis of the vessels.

In the left eye the retinal veins appear to be a trifle fuller and darker than in the right.

The field of the right eye does not show any changes for form or colors, while that of the left shows a cut across the upper portion of the form field, to about 25 degrees, that seems to be more than would be accounted for by the ptosis. With the left eye the patient could not notice any colors in a 10 mm. circle.

TOXIC AMBLYOPIA.

Quinine Amblyopia. Three cases of what he regards as idiosyncrasy to quinine are reported by Traquair.[7] The first patient took 2 or 3 grains a day for three weeks, and then was given 20 grains in a single dose. Sight was promptly lost, and remained so for a week. Eight months later, the pupils showed a tendency to dilatation, the fields were contracted; there was optic atrophy with contraction of the retinal vessels, and the light sense was severely impaired. In the second case, 15 grains of quinine-urea hydrochloride were given every four hours for about thirty-six hours, a total of 120 grains being taken. Total blindness supervened in a few hours; sight began to return in eight days. Three months later, the fields were much contracted, the discs pale, the retinal vessels constricted, the sight was dim, and the condition was "very unsatisfactory." In the third case, 2 to 5 grains of quinine were given in cachet every four hours for one night. Two to three days later the patient was found to be blind. The total dose of quinine consumed in the twelve hours was estimated to be less than 20 grains. Two months later, the fields were contracted and the discs pale. A month later still, constriction of the retinal vessels was added to the other ophthalmoscopic

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(7) Edinburgh Med. Jour., March, 1919.

signs, the fields were greatly contracted, and the patient had difficulty in reading. Traquair discusses the various aspects of quinine poisoning; it is, indeed, well that the idiosyncrasy of certain patients should be brought prominently before the notice of tropical practitioners at the present time.

A Case of Idiosyncrasy to Quinine. R. H. Elliot[8] relates the following instructive story:

A. G., a dispensing chemist, understanding that the author was interested in quinine poisoning, consulted him as to the nature of certain unpleasant symptoms, which he experienced when he took low doses of ammoniated quinine or of any other form of the drug for influenzal colds. He stated that within a quarter of an hour of taking the drug, he suffered from headache, deafness, a difficulty in seeing clearly, and a contraction of his field of vision. At the same time, he found a difficulty in reading, the letters appearing doubled. He consented to take a low dose for the purpose of observation. That actually taken was 2 grains of powdered sulphate of quinine in a cachet. Being a very busy man, the time he could give was limited.

On examination beforehand, it was found that the edges of the discs were slightly blurred and surrounded by faint haloes; the appearances suggested that he might at some time have had a very mild optic neuritis; the color of the discs was normal. He stated that some years previously, he had had a severe attack of influenza, and had noticed that his sight had been worse ever since. The R.E.V.=6/6 nearly, not improved by spheres; L.E.V.=6/6 slowly but correctly; the diameter of each pupil=3.5 mm.; he read No. 1 type easily with his own glass at 41 cm.

Twenty minutes after swallowing the quinine, he had a headache, and was deaf and rather slow in manner. R.E.V.=6/12 partly; L.E.V.=6/6 partly; the optic discs were decidedly paler than before, and the arteries were slightly but distinctly lessened in caliber. He read the same type as before at 41 cm., but had much more difficulty in so doing. Examined three quarters of an hour after the original dose, the pallor of the discs was

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(8) Brit. Jour. Ophthal., January, 1919.

accentuated, and the arteries were smaller, one of the latter (superotemporal branch, R.E.), which showed a sharp kink under ordinary circumstances, now appeared to have its lumen obliterated at this point. The pupils were each 4.5 mm. in diameter as against 3.5 mm. before the induction of cinchonism. They reacted to light and slightly to accommodation.

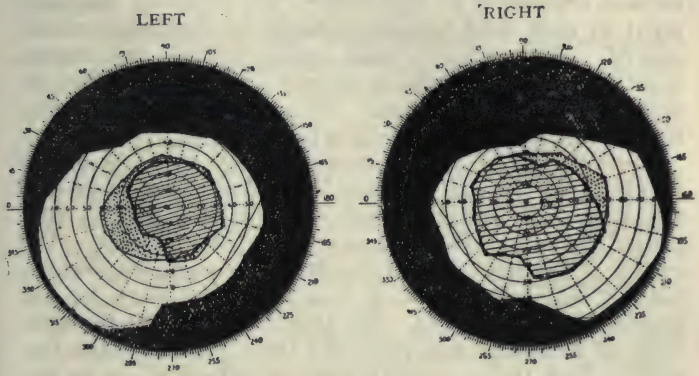

Fig. 23. The white areas show the normal fields, as taken before quinine was administered. The shaded areas show the fields taken half an hour after the dose of 2 grains of powdered sulphate of quinine. The dotted areas show the portions added to each field 15 minutes after a cup of strong coffee had been taken and one hour after the original dose. At this time he stated that he felt his fields were improving. The examination was made with a 1 mm. moderately bright spot, with a self-lit electric perimeter, in a dull light in a dark room. Under these conditions, the normal fields should have been a little over the full.

The most remarkable changes, however, were in the fields of vision, as shown in the accompanying charts (Fig. 23). The outside white limits represent the fields before the experiment commenced. The shaded areas show the portion of field left when taken half-an-hour after the quinine was administered. A self-lit electric perimeter was used, the object employed being a 1 mm. spot of moderately bright light, which in a normal eye should have given a full normal field. It will be observed that it did not do so, even before the drug was given, thus suggesting that the optic nerve was not wholly normal to start with. A control experiment was made on a patient who had occasion to take 10 grains of hydrochloride of quinine; his fields, etc., remained quite unaltered.

The patient had stated that a cup of coffee relieved his symptoms and speedily restored the field to normal. He was accordingly given a cup of strong coffee 45 minutes after the quinine dose. His fields were taken a quarter of an hour later, at which time he stated that he was beginning to feel better; the resulting improvement in each field has been shown by dotting the area gained. The patient's time being limited, the experiment had to be brought to an end. The color vision remained normal throughout. It was not possible to test his light sense in the time available.

Remarks.—The main interest of the case lies in the fact that the dose given is the lowest yet recorded as having provoked quinine amblyopia, with a record supported by a careful examination of the patient. The extent of the reduction of the field is remarkable, but the patient maintained that it was much less than he had previously experienced. He attributed this to the good state of health he was in at the time. Possibly the fact that he took the quinine in powder instead of, as he had previously often done, in a solution of the ammoniated drug, furnishes a more reasonable explanation. The author was naturally handicapped by his anxiety not to overdo the effect produced.

Caffeine has been recommended in the treatment of quinine amblyopia. A doubt as to the advisability of using this drug as a remedy might arise from Schwabe's case of a woman of 33 who had suffered for years from quinine amblyopia and whose fields were always rapidly contracted by the ingestion of strong tea or coffee. That case is a very difficult one to understand and the observations now published appear to indicate that caffeine has justly earned a reputation in treatment of quinine amblyopia.

The question arises as to whether the original trouble with the man's vision may not have been due to the quinine then taken, rather than to the influenza. It is quite clear from the records of other cases that a previous decided attack of quinine amblyopia may render a patient unduly sensitive to the action of the drug ever afterwards.

The large doses in which some experts in tropical diseases are advocating nowadays that quinine should be administered, raise a situation which demands that all cases of quinine amblyopia should be published. It seems doubtful if they have realized the danger that threatens the patient from the ophthalmic side of the question.

Toxic Amblyopia after Homatropine. As James A. Craig[9] properly states, cases of *poisoning due to the instillation into the eye of solutions of homatropine* are sufficiently rare to justify the publication of a case. As will be seen from the statement, there is room for conjecture as to whether the symptoms were entirely due to idiosyncrasy on the part of the patient, or at least in some degree to impurity of the drug. This was the product of one of the best known and most trustworthy of British manufacturing chemists, and was dispensed by a local firm with a very high reputation for accuracy.

The patient, A. B., aged 5½ years, suffering from hypermetropic astigmatism, had, two years earlier, had her refraction determined after atropinization. On this occasion, a solution of sulphate of atropine, gr. 4 to ℥1, had been dropped into each eye twice daily for three consecutive days. There was then no symptom whatever of belladonna poisoning, so that it may safely be assumed that the patient had no undue susceptibility to atropine.

On her return two years later for re-examination, it was considered sufficient to use homatropine. A drop of the solution, 4 gr. to ℥1, was instilled into each eye, and the child was allowed to go out with her mother to visit some friends in the immediate neighborhood, with instructions to return in an hour. When she did return—two hours later—the cause of the delay was sufficiently obvious. The child was in a condition of intense mental excitement, laughing, talking incoherently, and with hallucinations of vision. She also complained of dryness of the mouth. As examination was out of the question she was sent home. The excitement continued without abate-

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(9) Brit. Jour. Ophthal., June, 1919.

ment until 3 o'clock in the following morning (*i.e.*, ten hours), when she fell asleep. On waking five or six hours later, her condition had become normal.

The same solution has been frequently used since. In the majority of cases, the patient has been conscious of no unusual general effects. In one or two, however, there has been produced a slight sensation of giddiness together with some dryness of the mouth. This would suggest that impurity of the drug, may, in some degree, account for the facts of the case.

Congestive Glaucoma after Homatropine and Eserine. H. M. Desai[1] relates the following history: Mrs. S. B., aged 48 years, attended the Sunderland Eye Infirmary on May 3, 1918, to have her eyes tested for distant glasses. Had glasses for near work in October, 1917, and they were quite satisfactory. V.=6/18. Tension, as tested by the fingers, was normal and pupil reaction was good. Mydriasis was produced by homatropine 1 per cent. and a drop of eserine sulphate 1 per cent. was instilled in each eye before the patient left. Refraction +4.5D. in each eye. V.=6/6 in both with glasses. The patient returned on Monday, May 6, complaining that she had severe pain and loss of sight in the right eye since Saturday. She presented all the symptoms of congestive glaucoma—dilated immobile pupil, very shallow anterior chamber, and steamy cornea; tension 45 mm. of Hg with Schiötz' tonometer. V.=light perception. Fundus could not be seen. After repeated instillations of eserine the pupil was distinctly contracted and, as the patient would not consent to an immediate operation, more eserine was given for home use.

May 8. Eye quieter. T.=30 mm. of Hg. V.=fingers at a foot. Iridectomy was performed the same day. Tension remained subnormal for two days then rose again and was 25 mm. of Hg on May 12. As it did not diminish under eserine, Elliot's operation of sclerocorneal trephining was done on May 15 with satisfactory and so far permanent result. Tension was 15 mm. of Hg on the tenth day after the operation and has remained normal ever since. V.=6/36. With glasses

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(1) Brit. Jour. Ophthal., June, 1919.

+2.5D. sphere V.=6/18. Refraction of the eye has been increased by 2 dioptres (26-6-18).

The chief points of interest in this case are:

1. Onset of congestive glaucoma after use of homatropine, in spite of the fact that eserine had been used to counteract its effect, thus showing that homatropine had continued to act after the effect of eserine had passed away.

2. Failure of iridectomy to relieve hypertension. This may be due to faulty technique, but the writer has since found Elliot's operation easier, no way more painful, and more satisfactory than iridectomy in cases of congestive glaucoma.

3. Increase of refraction due to permanent stretching of the zonula and pushing forward of the lens. Refraction was still the same in December as it was on June 26, 1918.

[Although there are a number of cases of glaucoma reported *following* the use of homatropine it must be remembered in this connection (1) that this drug is instilled into the eye for determining the refraction and for other purposes thousands of times daily, and that it would seem strange if some of these eyes were not *at the time* already *in articulo glaucomatis;* (2) dilatation of the pupil for more than an hour or so *by any drug* may precipitate an attack of glaucoma in patients predisposed to the disease; and (3) reported cases of homatropine glaucoma are excessively rare in which it had been demonstrated by a careful examination (tonometer, ophthalmoscope, proper perimetric measurement, etc.) that the eyes were free of increased tension or of early symptoms of glaucoma. In spite of its rarity, however, the possibility of precipitating or causing an attack of glaucoma should be kept in mind, and *massage with a mild eserine* ointment be carried out after the use of homatropine in subjects more than 35 years of age.—Ed.]

Ocular Symptoms of Botulinus Poisoning. De Saint-Martin[2] reports the histories of four patients who developed the usual symptoms of botulism after eating canned smoked trout. They also presented extreme and persistent congestion of the papilla and retina, with amblyopia. The optic nerve and retina lesions were still evident six months after; also considerable contraction of the visual field for white and even more for colors, but there was no scotoma or imperfect discrimination of colors. The asthenia also persisted for an unusually long time. This and the torpor were so marked at first that the men could not leave their beds for almost three weeks. De Saint-Martin suggests that these comparatively severe and long persisting ophthalmoscope findings may aid in the differential diagnosis of botulism at the time and even months later.

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(2) Bull. de la Soc. méd. des hôp., January, 1920.

[The numerous examples of *botulism with ocular symptoms* recorded in the medical press of the United States during the past year render these reports of more than passing interest. A complete account of the whole subject will be found on pp. 12776-12780, vol. XVI of the *Am. Encycl. of Ophthalmology.* Canned goods (olives, asparagus, etc.) have been responsible for most of the fatalities. Of the seven cases reported by C. G. Jennings (*Journal Amer. Med. Ass'n,* Jan. 10, 1920) five ended fatally. All the patients had oculomuscular pareses, generally of the third, fourth and sixth nerves. Until we know more about its finer etiology, let us say that the proximate cause of the poisoning is the *Bacillus botulinus* and its toxins.—Ed.]

Wood Alcohol Blindness. The *News Letter* for October, 1919, issued by the National Committee for the Prevention of Blindness, draws attention to the fact that during the last few months scarcely a day has passed without bringing to the office of the Committee press clippings announcing new cases of death and blindness resulting from the drinking of wood alcohol or denatured alcohol. These cases are due in part to the ignorance of many regarding the poisonous qualities of these fluids, and in part to the fact that unscrupulous persons sell mixtures adulterated with wood or denatured alcohol. So alarming has the matter become that the office of the Commissioner of Internal Revenue has issued the following notice:

> Reports recently received in the Bureau establish that completely denatured alcohol is being used extensively for bathing and rubbing purposes. This is contrary to the law and regulations, and such uses cannot be tolerated, as the completely denatured alcohol is highly injurious to the skin and animal tissue.
>
> It is also established that completely denatured alcohol is being sold by irresponsible dealers under circumstances as to assure them that it is being used for beverage purposes. Where it is so used for any length of time blindness inevitably ensures, and the continued use can only result in death.
>
> Collectors should use every means at their disposal to make known to the public the dangers of either external or internal uses of completely denatured alcohol. Wherever collectors or revenue agents in charge hear of a misuse of completely denatured alcohol, a most thorough and careful examination should be made immediately and all the facts fully reported to the commissioner for the infliction upon the responsible parties of the ultimate penalties provided by law.
>
> In view of the grave and extended abuses of the use of completely denatured alcohol reported, it is deemed necessary to print upon the labels affixed to wholesale and retail packages a further and more specific warning as to its use than is shown on the present required label.
>
> In addition to the present matter on the labels there will be required on all new labels hereafter the printing in large letters in red ink, under the skull and bones symbol, the word POISON, and at the bottom of the label there will be printed the following statement:
>
> > ''Completely Denatured Alcohol is a violent poison. It cannot be applied externally to human or animal tissue without seriously injurious results. It cannot be taken internally without inducing blindness and general physical decay, ultimately resulting in death.''
>
> Until the present stocks of labels are exhausted this additional matter may be affixed to the containers on a separate label pasted above the present required label.

To help in educating the public to a wide knowledge of the dangers from the use, external or internal, of wood alcohol or denatured alcohol, the National Committee for the Prevention of Blindness has enlisted the coöperation of the press throughout the country in printing a short popular article on the subject. A more comprehensive exposition was prepared by the field secretary, to appear in the October issue of *Safety,* published by the Safety Institute of America.

To the same end the National Safety Council issued a special bulletin on the subject that will come to the attention of over five million workers in the industries of the United States.

[For the past fifteen years, in this Series and elsewhere, the Editor has joined with other sanitarians in drawing attention to the poisonous qualities of Columbian Spirits and other forms of deodorized wood alcohol. That such warning had a real basis is shown by the annual tale of death and blindness recorded in America. Recently the report of the Metropolitan Life Insurance Company for the first four months of 1920 shows that there were forty deaths from wood-alcohol poisoning incidental to the use of adulterated beverages. During the same time there were eighteen deaths from acute or chronic ethyl alcoholism. Under present conditions, wood-alcohol poisoning is, according to this report, a significant cause of death. Further comment seems needless.—Ed.]

GLAUCOMA.

Treatment of Glaucoma. The paper of J. E. Weeks[3] on this subject is of great practical value, since it is the report by an operator of large experience of his personal impressions of the various forms of treatment for glaucoma employed during a period of thirty-two years. He regards the principal determining causes of hypertension as:

1. Obstruction to the outflow of liquids from the interior of the eye by (*a*) inflammatory products, as the presence of fibrin in the aqueous, blocking the spaces of Fontana, or of non-diffusible substances, such as colloids or albuminoids, which do not readily pass through the filtration spaces (anterior chamber usually deep); (*b*) encroachment of the iris on the spaces of Fontana following increase in the size of lens or increase in the contents of the vitreous chamber (anterior chamber shallow); (*c*) the incarceration of the iris or the capsule of

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(3) Jour. Amer. Med. Ass'n., Oct. 11, 1919.

the lens in a cicatrix after traumatism, or wounds made by the removal of cataract or other operation opening into the eyeball (anterior chamber compromised); (*d*) development of iris cysts and tumors, or thickening of the iris; (*e*) increase in volume of the contents of the vitreous chamber by retinal or chorioidal hemorrhages, or by the intra-ocular growths.

2. Sclerosis affecting the lymph spaces at the sclerocorneal junction, as in buphthalmos or after interstitial sclerokeratitis (anterior chamber usually deep).
3. Increase in intra-ocular secretions, as in abnormal conditions of the vascular system (aortic insufficiency plus extensive temporary increase in arterial tension).
4. Retention of aqueous in the posterior chamber.

In at least 90 per cent. of all patients with ''idiopathic'' glaucoma, except in infantile glaucoma, there is a history of chronic constipation. The correction of this condition goes far to relieve hypertension.

In regard to range of tension as measured by the tonometer of Schiötz, Weeks has seldom seen a normal eye with a uniform tension less than 12 or more than 27, the usual normal range being from 16 to 25. In pathologic eyes without perforation he has noted a tension of from 1, the lowest, to 130, the highest.

In ''idiopathic'' glaucoma, very marked variations in tension may take place. Thus, he has noted a tension of 40 in one eye of a patient and 50 in the fellow eye. On the succeeding day the tension was 22 degrees in both eyes, and on use of a 1 per cent. solution of pilocarpine once daily this tension has remained.

The miotics employed in the treatment of glaucoma are, of course, pilocarpine and physostigmine (eserine). As adjuvants, jaborandi is used internally, opium at times, and also free catharsis. The writer has not found advantage in the combination of ethylmorphine hydrochloride (dionin) with these remedies. The pilocarpine and physostigmine are usually dispensed in a sterile 3 per cent. solution of boric acid to avoid rapid deterioration of the solution. He has never experienced bad results from the use of these remedies except a transient hyperemia of the iris in a very few cases after the use of physostigmine. Solutions of pilocarpine, if persisted in for some time, produce irritation of the conjunctiva in a small percentage of patients, but never any disease of the eyes.

Miotics have been employed in the way of a preventive as well as a corrective measure. Pilocarpine in strength of from 0.33 to 1 per cent. is prescribed in many cases in which the tension is at or near the upper limit of normal, in which the anterior chamber is shallow, and in which there is even slight cupping of the whole or a portion of the disk. The pilocarpine is used once a day, at night, on retiring, rarely twice daily, and the solution is freshly made once in two weeks. The treatment is continued a longer or shorter time, as may appear to be desirable.

It is a routine practice to test the tension of the eyes of all patients by digital palpation. If the tension appears to be above normal, or the history or the appearance of any part of the eye indicates hypertension, present or remote, a tonometric measurement is taken.

In all cases of tension above 25, as determined by the Schiötz tonometer, miotics are resorted to and an endeavor is made to keep the tension at or below that degree. The fields of vision for form and colors are taken from time to time, and the degree of vision is determined.

In regard to the effect of miotics, it has been possible in a number of cases of "idiopathic" glaucoma of various forms to keep the tension at about the upper limit of normal, and to hold it there for many years without deterioration in vision or loss of visual fields. In one case, after a period of two years of hypertension, the tension became subnormal and the miotic was discontinued Three years have passed, and the hypertension has not returned. In quite a high percentage of cases the hypertension may be controlled for a longer or shorter period, and then the fields and vision begin to fail in spite of increase in strength of the miotic, and operation becomes necessary.

There are but few cases of "idiopathic" glaucoma that are not more or less affected by the instillation of miotics, although it is frequently impossible to bring the tension down within the normal range, namely, from 16 to 25 mm.

In hypertension after cataract or other operation on the eyes, a high percentage of permanent relief is obtained by the use of miotics.

In regard to dosage, the strength and frequency of use is entirely regulated by the necessity, beginning with pilocarpine in 0.33 per cent. solution once or twice daily, increasing to 2 per cent., instilled as frequently as is required, or changing to physostigmine solution (the salicylate being used as a rule) varying in strength from 0.25 to 1 per cent., and instilling it from one to four or five times daily as required. If physostigmine, 0.5 per cent. used three times in the twenty-four hours, does not suffice to keep the tension at or below 25, Weeks insists with very few exceptions, on operation.

In secondary glaucoma the effect of miotics is seldom so marked as in the "idiopathic" cases. A reduction in tension of from 10 to 20 may often be obtained, but it will probably not be easily attained and is difficult to maintain. Treatment by miotics in these cases, if the hypertension is above 35, is not of much value, as a rule, although there are exceptions.

For many years Weeks has made it a routine practice, when time and circumstances permit, to try the effect of miotics in all cases of hypertension before advising operation. There are a number of conditions which may develop which cause him to decide that operation is desirable, and, when convinced that operation is the conservative course to pursue, Weeks informs the patient that he must assume responsibility for the consequences if the advice is not followed. A diminution in the field of vision for form or colors, with or without enlargement of the blind spot, is an urgent sign, as is also a slight positive diminution of vision. It is allowable to permit a low degree of hypertension if no falling off in field for form or colors or diminution of vision can be detected, but such patients must be watched with great care to prevent irreparable damage through unexpected exacerbations in tension. Operation is advised if the patient is found to be inclined to irregularity in the use of the miotics, and in cases of contemplated long absence from efficient observation by a competent ophthalmologist.

Experience has convinced him that early operation is desirable. The degree of vision present when a glaucomatous eye is not in a state of congestion is seldom much better after operation; nor is a contracted field much enlarged. There are, of course, exceptions to this rule, but they are not great in number. Loss of field almost to the fixation point need not deter operation, as the fixation point will be included in the blind portion of the field much more quickly if operation is delayed than if operation is performed. Small retinal hemorrhages do not contraindicate operation if other conditions are urgent.

The operations to be employed must be determined by the characteristics of the individual case. Buphthalmos and other forms of "infantile" glaucoma are not, as a rule, satisfactorily treated with miotics, but in some cases miotics act very well.

In *buphthalmos,* paracentesis may be resorted to in the early stage of the condition. When seen shortly after birth, the cornea will be more or less opaque, with a stippled surface, except at the periphery. A small paracentesis performed at the limbus, the opening being made patent every five or eight days for a few times, as required, will cause the entire condition to improve. If followed by miotics, the result will often be quite satisfactory. When the patient has reached the age of from 4 to 8 years, trephining is the operation of choice, a trephine of not more than 1.5 mm. in diameter being used. The anterior chamber will be deep, and a conjunctival flap of fair thickness can be obtained. A liberal piece of iris should be excised.

Neither iridectomy nor the Lagrange operation in buphthalmos is satisfactory because of the extreme thinness of the sclera and cornea, and because of the difficulty of obtaining a filtrating cicatrix without endangering the contents of the globe. The opening after a trephine operation has a tendency to enlarge by stretching. Consequently, a large trephine should not be employed.

In other cases of infantile glaucoma in which the globe is not enlarged, some other form of operative procedure may be employed.

In Weeks' practice, secondary glaucoma is encountered in about 4 per cent. of the cases of cataract extraction. In some of these cases the capsule of the lens appears to be the cause.

A few times after cataract extraction the writer saw the iris on one or both sides of the coloboma in combined extraction and extraction after preliminary iridectomy incarcerated in the angle of the wound. Hypertension has developed subsequently in some of these cases. If the anterior chamber is opened at a suitable place and the columns of the coloboma on the incarcerated side are freely divided, the hypertension will be relieved in the majority of such cases. Some cases of hypertension following cataract extraction not due to either of these causes may be relieved by operation. In one patient after operation for the removal of cataract by a colleague, a trephining, made at the outer part of the coloboma, a 1-mm. trephine being used, gave permanent relief. In a case of simple extraction, hypertension developed about six weeks after the uncomplicated extraction. In Weeks' absence from the city, Herman Knapp performed the usual iridectomy, permanently relieving the hypertension. The patient was subsequently under Weeks' observation for eight years. The tension of that eye remained normal.

In secondary glaucoma accompanying acute or subacute iritis, the hypertension will as a rule subside spontaneously in a few days. At times, operative procedure becomes necessary. In these cases paracentesis, one or more times, followed by opening the wound every second or third day, is usually sufficient. The paracentesis should be made at the limbus, pushing a narrow flap of ocular conjunctiva before the point of the knife, so that the wound at the sclerocorneal margin will be covered when the knife is removed. Rarely an iridectomy upward is required.

The secondary glaucomas that follow sclerokeratitis, or after interstitial keratitis, are not usually successfully treated by a simple iridectomy. In these cases, since the glaucoma follows the partial closure of the lymph spaces at the sclerocorneal junction by the sclerosing process following the inflammation, a filtering cicatrix must be obtained by some form of operation in order to give permanent relief from the hypertension. Such a filtering cicatrix *must* be obtained in virtually all chronic cases in which the anterior chamber is deep.

The largest percentage of cases of glaucoma is made up, of course, of the "idiopathic" cases, conveniently described as the acute, subacute and simple chronic cases. The acute cases frequently present a very high tension, ordinarily (if not treated) running a course of from two to three weeks, when the tension sinks approximately to the upper limit of normal, with more or less loss of vision. As a rule, Weeks finds it necessary to operate at the height of an acute attack, as in by far the greater number of cases the tension can be greatly lowered in a few hours by treatment. The treatment that is usually employed is, locally, physostigmine, 1 per cent., every hour, if tolerated (exceptions are very rare); systemically, a calomel purge, morphine hypodermically, and light diet. If after twelve hours there is no diminution in the tension, operation is performed. If the tension is subsiding, operation is postponed until the eye has become as nearly normal as possible, when a broad iridectomy is performed. This operation is with few exceptions all-sufficient in these cases. Posterior sclerotomy before the iridectomy is seldom necessary.

For the *subacute and simple chronic cases of glaucoma* he prefers an operation that will permit of the formation of a filtering cicatrix. Ophthalmology owes much to Elliot and Lagrange for the operations they have advocated, and for the extensive study and painstaking elaboration of their work. Weeks has performed the Elliot trephining operation fifty-eight times. Unfortunately, intra-ocular hemorrhages followed in two cases, iritis in six cases, detachment of chorioid in two cases, return of tension from blocking of the opening in a number of cases, and late infection in two cases. At present he limits the use of this method to buphthalmos, some cases with deep anterior chamber, and to cases of chronic simple glaucoma, mostly with relatively low hypertension. The Lagrange operation, which he has performed

269 times, is relied on for the forms of glaucoma other than those reserved for the Elliot operation. The operation is performed as described by Lagrange, except that the incision is seldom more than 5 mm. long (Lagrange advises 7 mm.). The shorter incision is employed to avoid the danger of prolapse of the head of the ciliary body or of the lens into the wound, and to lessen the possibilities of escape of vitreous. In this series of cases there has been deep intra-ocular hemorrhage once. The openings have been occluded by the falling forward of the head of the ciliary body in three. There has been loss of vitreous in three cases. Hypertension has recurred in a small percentage of dispensary cases because of inability to have the after-treatment followed up; but in private cases, hypertension has recurred to an extent to nullify the result in only four instances. There has been but one light case of iritis and no case of late infection.

In employing this operation the after-treatment is very important. Massage should be employed daily, beginning forty-eight hours after the operation in all cases in which the tension is not subnormal, for the purpose of gently forcing a very small quantity of the aqueous through the scleral opening, causing the conjunctiva covering the opening to bulge slightly. The massage should be continued a few days or weeks, as is found necessary, to secure a filtering cicatrix. The patient can be readily instructed how to perform the massage, and the after-treatment can then be conducted without the presence of the surgeon. The results in private patients have been most satisfactory. Weeks thinks that the Elliot operation will give a higher percentage of permanent relief of hypertension in patients who can not have satisfactory after-treatment, as in dispensary practice; but in private practice a greater percentage of satisfactory results, in the class of cases mentioned, can be obtained by the Lagrange method.

Eyes with "idiopathic" glaucoma of the non-acute type are subject to degenerative changes even after the correction of the hypertension, and we must not expect so high a percentage of such eyes to retain the vision present after a successful operation as would obtain after iridectomy for other conditions. The results of early operation are the most satisfactory. Eyes with advanced degenerative changes, particularly the chronic cases in which atrophy of the optic nerve is considerable, not infrequently continue to degenerate, but more slowly, after hypertension has been completely and permanently relieved.

[With Weeks, the Editor believes that not every case of glaucoma requiring operation is best and most certainly relieved or cured by some particular method; and there are many, perhaps the majority of cases, that would do equally well after any of a dozen or more operations. Following an experience extending over many years, during which time he has performed the Lagrange operation some seventy times, the Editor's impression is that the Elliot procedure, carried out strictly after the Colonel's instructions and especially when the trephine opening is made *well forward in the cornea,* is the operation most likely to succeed. Yet, glaucoma is a many-sided sign of ocular and often of bodily degeneration, and while continuing drainage of the inside of the eye is generally the most important and potent factor in a cure, there may be agencies at work that are irremediable, and bring disaster despite all remedies and any kind of operation at the hands of the most experienced of surgeons.—Ed.]

TUMORS OF THE EYE.

Diagnosis of Malignant Intra-ocular Growths. This heading may indicate the most valuable part of a contribution to tumors of the eye by Howard F. Hansell.[5] He begins by a reference to the difficulties in diagnosis between malignant and non-malignant inflammatory tumors in the vitreous chamber. The practical question intimately connected with the determination of the diagnosis is the line of treatment to be adopted in an individual case. Rarely may the growth, before enucleation, be declared malignant. The exceptions are those cases in which growth is rapid, with perforation of the

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(5) New York Med. Jour., Aug. 30, 1919.

coats of the ball, and extension to neighboring tissues. It is in the early stages, when enucleation will prevent metastasis, that the diagnosis is most important. The ocular conditions which interest us in this stage are:

Separation of the Retina. The first thought in the presence of retinal detachment, in which high myopia or traumatism have no causative influence, is of *chorioidal sarcoma.* The difficulty in making a positive diagnosis lies in determining whether the floating and undulating retina may have been originated by a tumor which has become concealed by edema or extensive serous exudation. The extent and situation of the detachment are of only slight diagnostic value. On the other hand, close observation of the course of the detachment extending, if possible, over several weeks or even months and including frequent measurements of the visual fields is most helpful. A gradually increasing area of blindness almost positively indicates tumor, whereas extensive fluctuations or an unchanged area point to other causes.

Intra-ocular Tension in Intra-ocular Tumor. Difference of opinion prevails as to the diagnostic value of this sign. It may be assumed that until the lens is pushed forward, the anterior chamber shallowed, the iris dilated and unresponsive, in other words the glaucomatous stage, the tension is normal or nearly so. The condition is not unlike that in retinal or vitreous hemorrhage. Here the blood is actually an additional content, but unless its volume is excessive and has disturbed the relation of intra-ocular secretion and excretion, plus tension has not been noted. The intra-ocular changes incident to or causative of hemorrhage may easily lead to minus tension. Almost uniformly, in spontaneous retinal detachment in which the subretinal space is occupied by fluid the tension is below normal and yet new material has been added to the intra-ocular contents without increasing the sum total of contents, if one may depend either on the tactile sense or the tenometer. Only when the normal relation between intra-ocular secretion and excretion is altered, or when the ball contains more than its normal capacity (which is subject to slight variation), in other words, when the eye becomes glaucomatous, is tension permanently increased. In the diagnosis of tumor, therefore, plus tension is not primary but secondary to the glaucomatous stage.

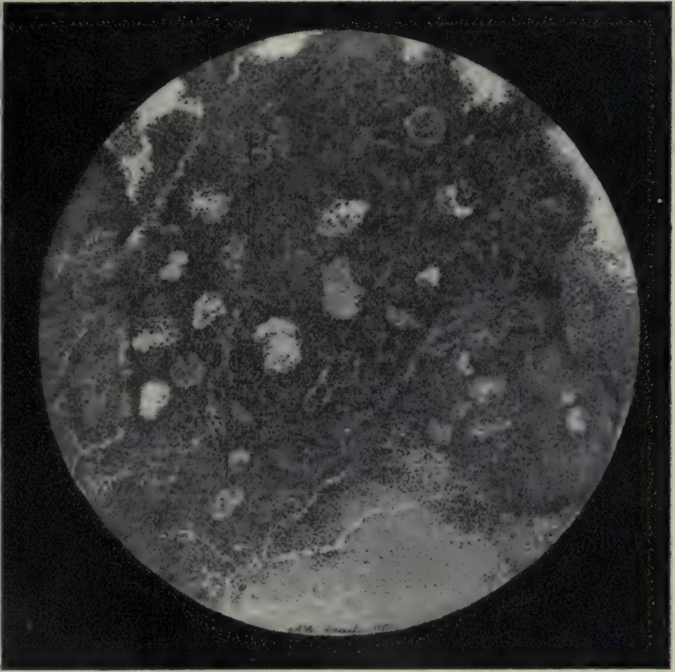
Transillumination of Intra-ocular Tumors. In making use of the transilluminator the room should be dark and the observer must critically study the pupillary reflex from every direction. It is not enough that he should make his decision from the most accessible or comfortable position, especially in the case of small tumors. This observation has not been made previously or at least it has not been emphasized. Without changing the contact of the transilluminator the pupil may appear dark to one observer and show the reflex to another. The explanation is to be found in the lack of uniformity in the density of the tumor and the condition of applying the light at or near its edge. The test is of great diagnostic value only in those cases in which the tumor lies in the anterior half of the ball, for one outside the accessibility of the instrument will, of course, cast no shadow.

Metastasis to the skin and internal organs has been noted in from one-third to one-half of the cases. Early enucleation is no preventive. Recurrence of the growth in the orbit is uncommon provided the ball has been enucleated before its external walls have been broken through. After the orbit has been invaded, recurrence, especially in the small round cell form, is to be expected. Hansell's experience has been particularly fortunate in that he has not seen a single case of metastasis from the eye to any of the internal organs and he is inclined to believe that the fear of metastasis is exaggerated.

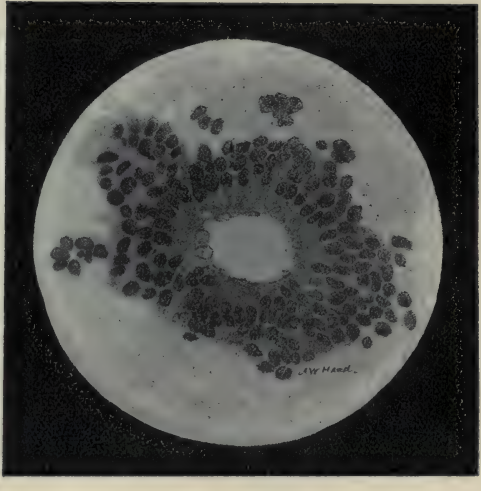
[The paper of Hansell is opportune and should be republished about once a year if for no other purpose than to remind us how often eyeballs are needlessly removed (and not infrequently by careful, competent surgeons) because of a mistaken diagnosis of malignant intra-ocular tumor.

The fact is, to distinguish an intra-ocular sarcoma or glioma from a gross iridocyclitic deposit or from a tuberculous mass is frequently difficult while, with our present means of investigation, the exact determination of a so-called cryptoglioma or cryptosarcoma is impossible. We may make a fair *guess,* but we can not *know.* All of

PLATE XI.



A. General view of tumor showing cells arranged around vessels and spaces.



B. Showing rosette of Wintersteiner.—Maghy, page 145.

which is proved by the fact that after an examination of twenty-four eyes excised for supposed malignant neoplasms by experienced and educated surgeons Treacher Collins found that the pre-operative diagnosis was incorrect in seven; Haab five times in twenty; Greeff four times in twenty-one.—Ed.]

Glioma of the Retina. A remarkable case of bilateral, retinal glioma in which the second eye was excised after an interval of eighteen years is reported by Charles Maghy.[6] Accompanying the report are colored drawings showing the histologic elements of the tumor; and these are herewith reproduced in black and white (Plate XI). The patient, female, 20 years old, single, in good health, had a series of fits during the summer of 1913, two or three each week, for a period of three months. On Christmas day, 1913, her left vision failed rather suddenly while at church and patient was led home. Four days later, the family physician was consulted and attended patient at intervals until October of the following year. The family history was negative.

On admission to the Royal London Ophthalmic Hospital, October 1914, the left eye was quiet, slight corneal haze present, but no "keratitis punctata" was seen. The anterior chamber was of normal depth and the aqueous clear. The pupil was circular and active. The iris, however, showed a few fine blood-vessels on its surface. The lens was opaque. Vision equalled hand movements and projection was quick and accurate. T. + 1. On October 9, J. Herbert Fisher performed a linear extraction under cocaine. The following day the eye showed some edema of the cornea and the pupil was dilated. T. full. Eserine 0.25 per cent. contracted the pupil, but the tension remained normal for a few days only, and on October 20, a posterior sclerotomy was performed. A few days later the nasal field was found to be defective, a deposit resembling "keratitis punctata" developed, the cornea became hazy, and the tension was again plus. In December, a whitish granular deposit, which on microscopic examination showed cells resembling degenerated mononuclear leukocytes, settled to the bottom of the an-

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(6) Brit. Jour. Ophthal., August, 1919.

terior chamber. Hemorrhage from the iris accompanied the paracentesis. Following a needling, the vision with a plus 12.00 D. sphere equalled 6/60 and with a plus 15.00 D. sphere, J.19. On March 9, 1915, the patient was discharged from the hospital, the vision now being reduced to the counting of fingers. Repeated operative measures failed to reduce the tension, but it was not until March, 1918, that the patient had severe pain. The eye was excised on May 17, 1918.

Right Eye.—The following is taken from the records of Moorfields Hospital, relative to the patient's right eye. "Admitted to hospital, July 7, 1900, on account of trouble with the right eye. Anterior parts of eye normal, with the exception that the anterior chamber is shallower than in the left. By oblique illumination a three-lobed mass was seen lying far back in the vitreous cavity with blood-vessels coursing over same. No reflex present. T. + 1. Vision equalled P.L. Vitreous cavity nearly filled with a white flocculent growth. Anterior chamber almost obliterated. Lens yellow and misshapen. Posterior surface drawn back to a peak at point where retina passes back to optic nerve. Retina detached at seat of growth. Chorioid *in situ,* optic nerve apparently not infiltrated. *Macroscopic report.*—Eyeball shows exophytic growth. At one spot layers of retina seem to be involved. Growth seems to spring almost entirely from inner nuclear layer. Inner granular layer invaded, also ganglion cell and nerve fibre layers. Cells grouped around blood-vessels. No rings of cells. Little degeneration."

Left Eye.—Pathologic report on eye excised May 17, 1918. *Macroscopic.* The left globe measured about 23 mm. by 22.5 mm. A staphyloma was present at the temporal side of the cornea, which extended backward about 6 mm. to 7 mm. The cornea showed a few fine nebulae peripherally, the central portion being quite clear. The iris appeared normal and the pupil was about 5 mm. in diameter and round, although slightly eccentric up and out. The aqueous was only faintly clouded. No lens present, but a strand of greyish tissue occupied its place. A grayish mass could be seen in the vitreous cavity. On section of the globe the vitreous was very fluid and contained a whitish deposit. The retina was not recognizable except at the anterior parts of the globe. The tumor extended forward to within a few micromillimeters of the lens capsule, but did not completely fill the cavity.

Microscopic.—Hematoxylin and eosine and Mallory's connective tissue stain. Cornea: This structure as a whole was thinned. The epithelium was absent in places, but otherwise was normal. Bowman's membrane was intact throughout. The stroma, although thinned, showed little evidence of inflammatory changes. Anterior chamber.—The conformation of the angle was changed as the root of the iris was in contact with the posterior surface of the cornea. The cells at the angle stained faintly and were probably degenerated leukocytes. A few glioma cells were also present.

Iris: This structure was more or less uniformly atrophic. On the posterior surface the pigment was heaped up into irregular patches at some places, while in others it was entirely missing, being attached to the lens capsule.

Ciliary Body: Contained glioma cells and was atrophic.

Vitreous cavity: The growth as a whole was quite vascular and was composed chiefly of cells that stained deeply with hematoxylin. No pigment was to be seen throughout the growth; areas of cellular degeneration were occasionally found. The cells immediately surrounding the blood-vessels stained more deeply than those situated peripherally, and at the extreme periphery of the so-called rosettes of Flexner and Wintersteiner beginning cell necrosis was in evidence. The retina at the posterior part of the globe was entirely destroyed by the growth. In the anterior parts it was invaded with glioma cells and was very atrophic. The chorioid was also atrophied and in places was only indicated by a dark line. The optic nerve was not involved outside the globe.

The portion of the tumor that was extrabulbar, in contrast to the intrabulbar portion, showed pigment changes and did not stain as uniformly. The vascular spaces were also much less clearly defined. The rosette appearance, so common in glioma of the retina, was lacking.

Maghy remarks that the case is of interest on account of the period that has elapsed between the excision of the two eyes, there being no case on record where the age of the patient exceeded 17 years. Fuchs mentions a case in a patient between 15 and 16 years of age.

In Lawford and Collins's series of sixty cases of glioma of the retina from 6 to 7 years is given as the maximum age at the time of the excision. The literature covering 120 cases from the Royal London Ophthalmic Hospital does not show that a single patient reached the age of 8 years.

The *American Encyclopedia of Ophthalmology*, Vol. VII, p. 5,583, states: "Glioma is a disease of childhood, no true case having been found after the sixteenth year. Cases heretofore reported of greater age have been found to be either sarcomas of the chorioid or pseudo-neuro-epitheliomata."

Wintersteiner mentions a case of the kind (*Das Neuroepithelioma Retinae,* 1897) cited by Pepper, No. 194, p. 348, in which the patient was 17 years of age, and the duration seven months.

The patient has not had a recurrence in the orbit or metastasis elsewhere, so far as is known at this period, although thirteen months have elapsed since the second eye was excised.

EYE SYMPTOMS IN GENERAL DISEASES.

Focal Infection from the Teeth. An important paper is that of Wirtz[7] who reports his experiences during the past seven years.

First he discusses the anatomic relations of the teeth and the eye and its surroundings, which in various ways make a propagation of dental affections to the visual organ possible. The most important part is attributed to the veins, especially the venous plexus of both organs which partly have the same outflows, *viz.,* the pterygoid plexus and the anterior facial vein. This,

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(7) Ophthal. Literature, 1919.

with the ophthalmo-facial vein, connects the venous plexus of the orbit with the numerous outlets of the teeth.

Wirtz distinguishes two types of immediate dental inflammations of the uvea:

1. Acute iritis with participation of the ciliary body and intense exudations into the refracting media. They set in suddenly and, in a few days, reduce vision to perception of light. The usual palliative treatment has no influence upon the course of the disease.

2. Chronic iritis, which generally is confined to the iris and shows little tendency to exudations, so that after persistence for many years the refracting media are scarcely clouded and vision is not much impaired. Its course is characterized by the large number of relapses, that usually heal after palliative treatment.

The etiologic dental affections in both types show great differences, and seem to produce the variations of the clinical aspect and course of the eye diseases, which undoubtedly are infectious, elicited by bacteria originating in the dental foci. The patients with chronic relapsing iritis belonged to circles in which a regular mouth hygiene is the rule. Their teeth had been taken care of and, when diseased, had been treated. They did not know that they had a dental affection until revealed by Roentgen rays.

The oral conditions of the patients with acute iritis were very bad, their teeth decayed, periodically painful and filled with remnants of decomposed food. Wirtz therefore assumes that in these cases very virulent pathogenic germs were conveyed to the eye in great abundance. That individuals with apparently good teeth had enough virulent material for affecting a distant organ, the author ascribed to special conditions, the most important of which is the manner of conservative dentistry. The teeth with diseased roots were rendered painless, treated antiseptically and closed air tight.

It is not always possible with our modern methods to destroy the pathogenic germs, and if in such a case the tooth is well sealed, the growth of the anaërobic germs is promoted and they are impeded in their usual development to the outside, so that the arising gases and inflammatory products escape to the bone, may reach the efferent blood-vessels and thus be conveyed to the eye. In several of his patients, gold crowns on diseased teeth, attached artificial teeth irritating the root and ill-fitting prostheses favored the extension of the infectious dental disease.

The fact that those parts of the eye, which have especially large connections with the venous plexus, *viz.*, iris, chorioid, and optic nerve, become predominantly affected, speaks, according to Wirtz, for the propagation in the veins.

Iritis from Dental Infections. In a recent paper F. A. Pockley[7] remarks that in over thirty years' practice as chief of the ophthalmic department of the largest general hospital in Australia and a considerable private practice and, though of late years he has been on the lookout for dental troubles and other focal infections as a cause, and has got advice and treatment in all doubtful cases from dentists and physicians, he has rarely, if ever, encountered a case in which he could satisfy himself that the teeth were the cause of iritis. Excluding syphilitic, gonorrheal, tuberculous, sympathetic and other cases of iritis, for which a probable cause or association can be found, his experience is that nearly all patients showed benefit or cure by the use of salicylates (and occasionally operations) combined with appropriate, local, ocular treatment.

[Although no one will argue that the pathologic processes known as pyorrhea alveolaris and related changes are normal conditions, and it will at once be admitted that for their own sake they should be cured as far as it is possible to do so, yet the suspicion may well arise whether they are to any large extent responsible for the various forms of scleritis, keratitis, iritis, chorioiditis and optic involvements so commonly ascribed to them. The history of medicine reveals the unhappy fact that its practitioners are prone to refer the causation of ill-defined diseases to the latest and most fashionable of origins—to the prevailing fad in etiology. "Focal infection" has for some time held, and still holds, a prominent causative

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(7) Med. Jour. Australia, Feb. 28, 1920.

place before the laboratory footlights. In a former decade, that place was taken by something else; in another ten years very likely still another hypothesis will dominate our prognoses and determine our forms of treatment. *Then* the status of localized infection-depots as a source of ocular symptoms will be more satisfactorily defined; or, perhaps, the theory of focal infection, so far as ophthalmology is concerned, will be sloughed off into the limbo of forgotten things. Meantime, the pendulum of opinion seems to have reached the extreme limit of its arc and is swinging back; and there is, consequently, a noticeable lull in the tooth-pulling obsession that has so long held this country in its grasp. *Now* is the time for some careful observer to have radiographs made of, say, 10,000 adults free of all eye symptoms and see whether the percentage of these with dental disease is *markedly* less than in the case of those with the obscure forms of eye trouble that are supposed to spring from Riggs' and related infections. Until the question is studied from such angles no very definite or valuable conclusions can be drawn as to the causative rôle played by diseases of the teeth in affections of the eye.—Ed.]

The Eye in Epidemic, Lethargic, Encephalitis. In a clinical review of cases in the Pacific Northwest Wm. House[8] identifies two types of invasion.

Type One. The slow type is far more common than the rapid, having occurred in ten of thirteen cases. In this type the predominating symptoms from the beginning were double vision, slight mental confusion, at times mild delirium, followed by other symptoms which depended apparently on the particular cranial nuclei involved. After a week or ten days, the patients appeared to improve and then developed the so-called lethargy to which the disease owes its name. During this week most of them suffered from insomnia and were given some form of sedative by the attending physician. With the development of the lethargic stage, of course nothing of that kind was required.

Type Two. This is more interesting in a way than the first type, largely because the manifestations are more dynamic. In cases of this type, the patients com-

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(8) Jour. Amer. Med. Ass'n., Feb. 7, 1920.

plained of some head pain followed by a rapidly developing delirium, which was acute and attended by hallucinations of sight and hearing of the most vivid character.

Of the individual symptoms the most import for the ophthalmologist is *double vision.* This was present in eleven cases. It was a vague kind of trouble. One patient first complained that while driving a team of horses he had never seen the automobiles so crazy, all of them wanted to run over him. It was four days before he was able to describe this difficulty of sight as double vision. This double vision was present in all eleven cases during the first week, and seldom lasted more than four or five days. This point alone should differentiate the disease from tuberculous meningitis, in which double vision seldom appears before the end of the second or the beginning of the third week. The origin of the double vision in encephalitis has not been made entirely clear. Any of the oculomotor nuclei may be involved, but the writer was unable definitely to determine which nerve was at fault in any except one case. In that there was distinct weakness of the right sixth nerve accompanying well-marked facial, that is, seventh nerve, palsy. In the other cases he thought there was weakness perhaps of all of the oculomotor nerves. He thought the patients were unable to move the eyeballs in any direction so freely as healthy persons are able to move them. When the eyes were directed either to the left or to the right, there was no fault in the action of the muscles except that the patients found it difficult to hold them in these positions. The tendency was for the eyes to rotate back to the middle line. Nystagmus was absent. The condition suggested not a true lesion of any particular nerve, but generalized weakness of all of the nerves. In other words, there was general ophthalmoparesis rather than ophthalmoplegia. Now, since this symptom in the main lessened or disappeared after the acute stage of the disease, it seems probable that it was due to some toxic effect or possibly to generalized pressure rather than to definite hemorrhagic or inflammatory lesions of the nuclei. The positions of the images were variously such as to suggest involvement of the third, fourth and sixth nerves in different cases; but the author's impression is strong that the patients did not automatically converge the eyes as in ordinary focusing, though they were able partially to overcome the difficulty by effort of will.

Nerve Changes. Other Cranial Nerves: No patient exhibited any symptoms of involvement of the first nerve. House examined the fundi in six cases and could detect nothing wrong with the second nerve. Ophthalmoscopic examination was difficult because of small pupils, ptosis and delirium; and fundus changes may have escaped detection. The seventh nerve was involved, causing paralysis of the muscles of expression in one case, and in this case alone could he demonstrate distinct weakness of the sixth nerve and possibly also of the fourth. The eighth nerve escaped involvement unless such auditory hallucinations as were witnessed could be attributed to it. This is not likely, as most auditory hallucinations are cortical in origin.

Nature and Cure of Migraine. P. Pagniez and A. Nast[1] report further experiences which, they assert, confirm the *alimentary anaphylactic nature of migraine.* They state that it can be warded off by a small dose of peptone before meals. After concluding a course of peptone, one man who had been subject to migraine since childhood, could take chocolate with impunity for a certain time, but then a smaller amount brought on the migraine. It was preceded by certain changes in the blood, the *crise hémoclasique.* Repeated blood counts showed normal leukocytosis after ingestion of the chocolate in five tests at three or four days' intervals. The sixth test showed total absence of the digestive leukocytosis, and in a few hours the leukocytes dropped from 6,000 to 3,700, with other signs of anaphylaxis. Prophylactic treatment with the peptone is not always effectual in these alimentary anaphylactic reactions, the authors state, but it should be given a trial, at least, as it often is temporarily and sometimes is permanently successful.

[This subject is also discussed on p. 12785, Vol. XVI of the *American Encyclopedia of Ophthalmology,* which

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(1) Presse méd., Apr. 28, 1920.

seems to corroborate the essential metabolic origin of at least *some cases* of sick headache. Do not let us, however, assume that all attacks of migraine are primarily intestinal; indeed they are probably all of mixed etiology. —Ed.]

OCULAR INJURIES.

Foreign Bodies Within the Eye. John J. O'Brien[2] furnishes three illustrative cases and a number of practical points in this important field of ophthalmic surgery.

His first case was that of J. M., aged 50 years, who was reaming holes in a locomotive boiler. Reamers are made from very hard steel. As the tapered end of the one he was using would not enter the hole, he hit the other end with a hammer. A piece of the brittle steel flew and penetrated his right eyeball 7 mm. to the nasal side of the limbus and 3 mm. below the horizontal meridian.

Within an hour after the accident, the foreign body was located by *x*-ray 14 mm. back of the cornea, 2 mm. from the retina on the temporal side and 5 mm. below the horizontal plane. The particle was 3x3x1 mm. With a magnet the steel was extracted from the globe through the wound of entrance. There was a little reaction without, but considerable haziness of the vitreous within the eye. The vision was 7/200 and no details of the fundus were visible. Within a week, as there was no pain and the external inflammation had completely subsided, the man insisted on returning to work, which he did. From this time to the present there has been no pain nor other untoward symptoms. He was put on 5 grains of potassium iodide in a glass of water three times a day. The haziness of the vitreous slowly cleared, so that now but a suggestion of it remains. The retina, vessels and papilla are normal and the vision without lens is 20/15 partly.

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(2) Amer. Jour. Ophthal., May, 1919.

Case 2. In July, 1918, J. S., while passing about ten feet away from a man who was chipping a steel casting, was hit in the left eye by what was supposed to be a piece of the chisel. Half an hour after the injury, the eye was quiet and showed a 5 mm. cut through the conjunctiva and sclera, 12 mm. from the limbus and just below the external rectus tendon. The conjunctiva was loosened and so sutured as to cover the wound in the sclera. Ophthalmoscopic examination showed nothing abnormal; nor did the appearance of the eye suggest a serious injury. The patient was sent home.

An hour later the shop hospital telephoned that there was probably a piece of steel in the eye, so the patient was at once sent for an *x*-ray examination. The roentgenologist reported a foreign body 1x1.5x0.5 mm. in the vitreous, 5 mm. anterior to the macula lutea. The same day the sutures were removed from the conjunctiva and a magnet applied to the wound. The foreign body was not recovered. An *x*-ray on the following day showed the foreign body in the original place. Another attempt to extract with the magnet was again a failure. The reaction from this second attempt was severe, so the eye was allowed to quiet. A third *x*-ray picture by a different roentgenologist was exactly like the two prior ones. A consultant agreed that if the foreign body were not recovered after another trial with the magnet the only safe procedure was enucleation. To this the patient and his parents consented. Another trial with the magnet resulted in another failure. The eye was removed. A most careful autopsy on the eye failed to discover any foreign body. But a subsequent *x*-ray of the orbit showed the same foreign body in the same place. It had not entered the globe at all but had passed between the conjunctiva and the sclera and lodged in the orbital tissues immediately adjoining the globe.

The roentgenologist of the Manhattan Eye, Ear and Throat Hospital willingly told O'Brien how to avoid a like tragedy in future: Suppose the exposure for the picture is ten seconds. For the first five, have the patient look straight out, then have him change the direction of the visual axis by rolling the eye up as much as possible and complete the exposure. Make another exposure but do not move the eye. If the foreign body is in the globe, the *x*-ray will show either two bodies or an extension in the direction of the movement of the opacity as compared with the latter picture. When the foreign body is in the orbit or adjacent tissues its position is not affected by any movement the eye will make. There is, however, a slight possibility of error when the foreign body is in an external ocular muscle or tendon. Then it will show some displacement, but a careful reading of the picture will discover the true meaning.

Case 3. A young man of 20 was hit in the left eye by a small piece of gun metal. It penetrated the cornea, iris and lens; and the *x*-ray showed it as if in the posterior capsule of the latter. The following day the lens was extracted in the hope of removing, with it, the gun metal. Another picture showed the gun metal in the original position. A month later an effort was made to remove the foreign body by washing the anterior chamber, using considerable force, but with no better result. The eye recovered so that in a few days it was quiet.

The patient and his father were advised that the safety of the right eye lay only in removing the injured one. They did not take kindly to this advice and consulted another oculist, who took charge of the case. The latter found a nasal sinuitis, treated it, and also operated on the eye, with what he believed a very happy result. Two and a half months after the accident the young man was about to be discharged from the hospital when the right eye became inflamed. Prompt enucleation of the exciting eye had no beneficial effect whatever. Notwithstanding the best hospital care and the most approved energetic therapeutic measures, the vision in the right eye dropped to bare light perception, and so remains.

A considerable experience with foreign-body cases has convinced O'Brien that among the very worst are those in which copper and its alloys enter within the globe. Failure of prompt removal of the foreign body should at once be followed by enucleation if disaster is to be averted and a tragic ending avoided. Should one be tempted to gamble with fate, or from any motive fail to sacrifice an eye that is, or almost probably will be blind, the associated memories that persist in hovering about such a case are certainly not pleasurable, whatever profit they may give as experience.

Caustic Burn of the Eye from Indelible Ink or Lead. W. H. Elmer[3] reminds us that although injuries to the eye by indelible lead are not very rare, the recorded cases have not taken on the aspect of a caustic burn. Therefore the following case is reported:

Oct. 13, 1919, F. L., aged 20, waitress, complained of pain in the left eye, and said that some ink had entered it twenty-four hours before. She was unable to state how this had happened; she realized that something was wrong only by the symptoms she had suffered, and knew it was ink by the appearance of the eye.

Examination revealed R. V. 20/20, L. V. 20/30, tension 0, both eyes. The left lower lid was slightly swollen, and the palpebral and bulbar conjunctiva of the lower fornix was congested, chemotic, and stained an intense purple, the color of the common indelible pencil lead. The stain increased in intensity downward, and among the tarsal folds was a clean cut, almost black ulcer, as if a fragment of the lead had rested there and exerted its effect strongly at one point. With a probe, it was ascertained that the ulcer was quite deep, almost penetrating to the infra-orbital margin. Almost the entire conjunctival surface beneath the lower lid stained with fluorescein. The upper lid and underlying conjunctiva were negative. There was slight staining of the lower margin of the cornea; the iris was clear, and the pupil of moderate size, but it responded rather sluggishly to light. Examination of the media and fundus detected nothing further.

The eye was irrigated thoroughly with sterile water till the waste showed no color, and then as much as possible of some black granular matter on the ulcer was removed with wet applicators. Atropine, 1 per cent., and argyrol, 20 per cent., were used; and after the conjunctival sac had been filled with sterile petrolatum, a patch was applied and the patient was sent to the hospital for

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(3) Jour. Amer. Med. Ass'n., Jan. 24, 1920.

further attention. Petrolatum was used in the eye every two hours for the next day, at the end of which period, iritis was found to be setting in. Atropine was started immediately and used every four hours next day, with the petrolatum continued at two hour intervals. On the following day the pupil was well dilated; and the petrolatum having been discontinued for a short time, fluorescein showed epithelization to be taking place slowly; but the patient was complaining of pain over the left cheek bone, and there was intense tenderness over the left intra-orbital margin, and some swelling and redness. Nasal examination disclosed no indications of maxillary sinusitis, and further investigation by means of the Roentgen ray was refused. Dry heat to the painful region was ordered, and atropine, argyrol and petrolatum were used three times daily. Slight adhesions that were forming were broken up with a probe. On the third day epithelization was complete except for the ulcer and a slight area around it, the pupil remained dilated, congestion was subsiding, and the pain and swelling over the cheek had improved. On the fifth day, there was no staining with fluorescein, congestion was slight, the purple stain was disappearing, and the complicating symptoms had vanished, whereupon the patient was discharged, to report at the office next day. The appearance at this visit was almost normal, the dilated pupil, slight congestion, and purple discoloration alone remaining, so she was ordered to use a boric acid eye-wash and argyrol, 20 per cent., once daily, and to report again a week later. When last seen, October 25, the eye appeared quite normal with 20/20 vision in each eye. A small scar was visible at the site of the ulcer, but there was no deformity from cicatricial contraction.

How this caustic substance could have entered the eye was not ascertained. Cosmetics for eyebrow and lid margin use might have been the source (and the patient was strangely reticent about the whole affair), but such accidents have been known to occur from pencil lead, though the effects have not been so violent as in this case. Elmer mentions a case reported to him on a personal communication as having occurred from this source, the same purple stain having resulted, but with no ill effects and with complete recovery in twenty-four hours after use of 1:3,000 mercuric chloride ointment.

The complicating pain and tenderness over the infraorbital margin seem to have been due to a moderately severe periostitis from penetration of the irritant through the tissues.

Lime Burns of the Eye. A recent editorial[4] remarks that the increase in the use of chlorinated lime for household purposes has resulted in a somewhat greater prevalence of burns of the eye by this substance. During July and August some twenty cases were brought to the attention of the National Committee for the Prevention of Blindness. The circumstances in each case were that a sudden explosion of gas from the inside of the can followed the opening of the container, the shower of lime dust usually striking the eyes and face of the victim. In most cases, complete recovery followed, as medical care was usually provided immediately after the accident. The care of such cases usually includes anesthetization with a few drops of 1 per cent. solution of holocaine or a 4 per cent. solution of cocaine, and then the removal of the remaining particles of the lime. The irrigating fluid should be a weak solution of vinegar to neutralize the caustic effect of the lime. Subsequently, cold applications may be applied to the closed lids, and a mild antiseptic, such as a boric-acid solution, dropped into the eye every two or three hours. If the burn is at all extensive, the conjunctival sac may be filled with an antiseptic ointment, which not only relieves the pain but also prevents the adhesion of opposing surfaces. The most serious and important sequel is the adherence of the lid to the globe (symblepharon) when there are two opposing raw surfaces. In an endeavor to prevent these accidents, the national committee took up the matter with manufacturers and distributors. The latter report that chlorinated lime decomposes when exposed to high temperature or to dampness. To avoid accidents, it is recommended that a small hole be punched in the container to allow the gas pressure to be released before the top is taken off the can.

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(4) Jour. Amer. Med. Ass'n., Dec. 6, 1919.

SYMPATHETIC OPHTHALMIA.

Sympathetic Ophthalmia. The latest work on this important study will be found under the foregoing caption in Volume XVI of the *American Encyclopedia of Ophthalmology,* in which the disease is fully discussed in all its relations by the essayist, Harold Gifford, the well-known authority on the subject. Every writer of recent military experience notes the rarity of sympathetic disease after gunshot wounds and other penetrating traumatisms of the eye; even though all do not agree as to the explanation of the fact.

Of the numerous articles on so-called transmitted ophthalmitis the paper of W. Zentmayer[5] deserves special attention. He discusses in particular those features of the disease which have baffled explanation by any of the theories thus far advanced:

1. The condition arises almost invariably, if not always, from penetrating wounds.
2. The injury is usually to the ciliary zone.
3. The disease occurs more frequently in children than in adults.
4. It is usually insidious in its course.
5. The disease is inflammatory and specific.
6. The interval between the injury and the developed disease varies greatly and may be several years.
7. Enucleation acts as a preventive but not absolutely, and appears to influence favorably the course of the developed disease.
8. The disease is rare.

Neither the ciliary nerve theory nor its modification by Schmidt-Rimpler and Panas requires refutation at this time beyond pointing out that the disease is an inflammation of a characteristic type, both in the injured and the sympathizing eyes; that there is a minimum period of incubation; that other conditions which may be presumed to be associated with marked ciliary irritation do not excite sympathetic ophthalmia. Panas' view that toxic conditions and other systemic conditions are predisposing factors associated with ciliary irritation cannot be set aside by the assertion that the affected individuals

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(5) Penn. Med. Jour., November, 1919.

are usually robust. Modern investigations show hidden sources of toxemia not incompatible with an outward appearance of health.

The specific metastatic theory of Mackenzie, Berlin, Römer, is in line with modern thought. It assumes that a specific agent from the injured eye enters the circulation and finds a specific affinity in the like tissues of the fellow eye. This theory fits in well with many of the clinical manifestations of the disease.

Elschnig's view, as stated by A. C. Woods, is: "The disintegrated uvea, or some portion thereof, in the exciting eye, is re-absorbed as antigen, and leads to a hypersensitiveness of the animal, and especially of the homologous tissue, in the uvea of the second eye. Further absorption of this disintegrated uveal tissue (or of some constituent thereof) leads to an intoxication of the sensitized uvea of the second eye, which manifests itself clinically as an uveal inflammation."

Woods points out that this theory explains the occurrence of the sympathetic inflammation irrespective of whether the disorder in the exciting eye is bacterial or otherwise, and that it also accounts for the latent period of from two to six weeks between the onset of the disease in the exciting eye, and its outbreak in the sympathizing eye, since the experimental animals develop their greatest sensitiveness at this period. The theory assumes that the uvea, or some part of it, can act as a foreign protein to the homologous animal and further that in so acting it possesses a distinct organ specificity.

The possibility of the irritating agent being present in Tenon's capsule at time of the enucleation must be considered. Wibaut has carried out investigation along anaphylactic lines and concludes that it is possible to produce inflammation in this way which is the picture of a uveitis of a focal character. The appearances, while not typical of sympathetic ophthalmia, are very different from that of septic endophthalmitis. It should be stated that Trubin, experimenting along the same lines, obtained results which led him to the conclusion that they lent no support to Elschnig's theory, and he emphasizes the clinical fact that enucleation of the injured eye would still leave the other eye endangered for a long period of time if sympathetic ophthalmia were an anaphylactic phenomenon.

Fuchs has expressed surprise that the characteristic histologic changes of sympathetic ophthalmia are not more often found in enucleated injured eyes. Meller believes that this is due to the fact that sympathetic ophthalmia is often of endogenous origin, the organisms in the blood settle in the tissue weakened by the injury, there become highly virulent and reach the fellow eye through the blood stream. When the characteristic histologic changes are not found the colonization of the organism has not taken place.

Knapp has presented the histories of four cases of sympathetic ophthalmia in which an autotoxic factor was present. In these cases an injury or an operation causing iridocyclitis in one eye was followed by serous iridocyclitis in the second eye. In one case the symptoms were mild and yielded readily to treatment; in the other three the ocular symptoms were those of typical serous cyclitis. The autotoxic factor depended on the following: There was generally a history of improper eating often associated with constipation. In two of the cases the stools were highly toxic. Harbridge's case was one of iridocyclitis following a successful cataract extraction with subsequent capsulotomy in the fellow eye. The patient had many decayed teeth and was persistently constipated. On this case, and a case of iridocyclitis of endogenous origin, in which there was a recurrence of the inflammation followed by a similar condition in the other eye with complete recovery following the extraction of two teeth with apical abscess, Harbridge argues a possible relation between a focus of infection somewhere in the organism finding elements in the second eye for which it possesses a definite affinity.

Pusey and Golovine suggest that the cells, probably those of the ciliary body and iris, give rise to a cytotoxin, which, having a selective affinity for corresponding cells in the other eye, there set up an inflammation.

Pathology. The claims of Fuchs as to the pathognomonic nature of the histologic changes described by himself and Ruge in both the exciting and the sympathizing eye have been accepted by most pathologists. These changes consist in an infiltration of the uvea with lymphocytes, in the midst of which there are focal collections of epithelioid cells with not infrequent giant cells. This peculiar infiltration often is present in only a few spots in the iris, ciliary body and chorioid. In other cases the chorioid alone is involved and from here the infiltrate may find its way into the sclerotic. Morax has more recently asserted that the way in which this proliferation takes place varies according to whether the wound is in the anterior or posterior portion of the globe. In the first class of injuries the infiltration of the chorioid and subchorioidal space by lymphocytes is greater in the deep ciliary layers, while in the second class, there is more marked infiltration about the entrance of the optic nerve.

Lessons of the War in Sympathetic Ophthalmia. The striking fact brought out in the war statistics of ocular injuries is the rare occurrence of sympathetic ophthalmia. Dimmer attributes this rarity to (1) early enucleation; (2) healthy condition of the patient. To these must be added resection of the iris and the use of conjunctival flaps.

In an unpublished communication Dr. de Schweinitz states his belief, based on his observations in France, that four factors have been potent in reducing to a gratifying minimum the incidence of sympathetic ophthalmia in the present work: (1) Accurate recognition of eyes so injured and inflamed that they should be sentenced to prompt excision; (2) proper early treatment of injured eyes; (3) the healthy general condition of most of the soldiers; (4) abstinence from unnecessary minor operative procedures.

In the Lariboisiere ophthalmic center there were seen 6,265 military injuries to the eyes with but one case of sympathetic ophthalmia. Lapersonne and Saxe each saw one case in their military services while Sourdille saw not any. Of 39 cases of sympathetic ophthalmia seen by Morax, 10 presented intra-ocular foreign bodies. In all but 6 of Morax's cases the exciting injury was a perforating wound of the cornea or anterior part of the sclera. Angelucci believes that after eight weeks from the time of the injury the danger of sympathetic ophthalmia is almost passed, though Morax had, in one case, a period of latency of seven and one-half months. Morax points out that sympathetic inflammation coming on after surgical intervention may be due to the original injury rather than to the operation.

According to de Schweinitz, sympathetic ophthalmia need not be seriously considered in case the eye is hopelessly shattered, is blind from a contusion without perforation, or is suppurating. Nor is a retained intraocular foreign body in non-infected surroundings of itself likely to cause sympathetic ophthalmia.

Zentmayer concludes from his own experiences with certain of the clinical features of sympathetic ophthalmia:

The disease may develop after cataract extraction where the operation has been followed by a slow not severe iridocyclitis without other evidences of infection; a period of eight weeks may supervene between enucleation undertaken because of severe iridocyclitis following extraction of an intraocular foreign body with a magnet and the development of sympathetic ophthalmia. Both these facts argue more strongly for the anaphylactic than the bacterial metastatic origin of the disease. The histologic findings of Fuchs have been repeatedly confirmed. A high leukocytic count has not always been found.

Despite the war statistics, it is dangerous though perhaps justifiable, to try to save an eye which has received a perforating injury to the ciliary zone with a prolapse of any of the intraocular tissues, and should not be attempted if the eye is practically sightless and remains inflamed at the end of ten days.

MILITARY OPHTHALMOLOGY.

Progress of Ophthalmology during the War Period. A brief but comprehensive review of this subject is made by A. Cantonnet,[6] who includes among the lessons from the war the importance of fatigue and emotional stress in bringing on hemeralopia, and the frequent involvement of the eyes in dysentery, etc.; conjunctivitis and

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(6) Médicine, January, 1920; abstracted in Jour. Amer. Med. Ass'n., March 6, 1920.

iritis in dysentery, keratitis and iritis in malaria, and recurring iritis in spirochetal jaundice. Similar complications ascribed to antityphoid vaccinations have been numerous, but analysis of them always disclosed a preexisting taint or predisposing factors or defective technique. The conclusion is obvious that the condition of the uveal tract should be ascertained before vaccinating against typhoid, especially in individuals over 35 years old.

He discusses further the disturbances in vision with pituitary enlargement, and the benefit to be obtained from radiotherapy. Pituitary treatment may yield good results. If operative measures are necessary, access through the nose is less dangerous, and sometimes merely trephining the posterior wall of the sphenoidal sinus relieves the compression enough without exposing the pituitary. The cure of squint by exercising the eyes, without an operation, has been reported by several. Bailliart has invented an oscillometer which, pressed on the eyeball, renders visible the pulse in the retina.

Terson has added another sign to those in vogue for determining of actual death: One or two drops of a mixture of copper glycerolate and ethylmorphine glycerolate are instilled in the conjunctival cul-de-sac. If life is still present, the conjunctiva turns red. New, also, Cantonnet adds, are the aviation tests for the velocity of the visual acuity, for nocturnal vision, and for vision facing sun glare.

[However it may act, the empirical prescription of cod liver oil and its success, as an agent curative of night blindness have long been carried out and recognized. Ishihora and Mori speak of this therapeutic practice as common in Japan. Upon the supposition of an abnormal decrease, in hemeralopia, of fat in the blood, the latter believes that he has established experimentally not only the lack of fatty globules in the body juices but has shown that improvement in the symptoms invariably goes along with an increase in the proportion of fat in the internal fluids.—Ed.]

Intra-Ocular War Injuries. In a paper discussing chiefly Lagrange's five laws governing ophthalmic injuries of a military character Capt. R. D. Sleight and Major Wilfrid Haughey[7] thus states the first law:

Injuries to the inner coats of the eye may be caused through commotion of the air from the explosion of a shell at some distance. There are also well-authenticated cases of luxation and subluxation of the lens, and of traumatic cataract, caused in this way. The fundus lesion usually seen is a rupture of the chorioid or retina or both at the posterior pole.

This law governs a group of injuries caused by a commotion of the air. The eyeball is shaken in the same manner as the air commotion will shake a building, the violence depending on the severity of the air commotion or the nearness of the source of the disturbance. The lesions are chiefly at the posterior pole of the eye, are variable in extent but are chiefly located in the macular or the paramacular region. The uveal tract being the more delicate structure is the first to be injured, therefore, we find that in this group of eye injuries produced by commotion, macular chorioidal rupture is most frequently found. We occasionally also have retinal hemorrhage and may even have the vitreous more or less tinged with blood.

Lagrange's second law is:

Injury to the orbit by traumatisms of the frontal region and radiating fracture of the orbital vault, usually involves the optic foramin or sphenoidal fissure and causes lesions of the sensory, motor, and optic nerves, the eyeball itself being uninjured.

The second group of injuries produces a different type of visual disturbances, which may be explained by functional disturbances of the nerves supplying the eye and adnexa, also by injury to the optic nerve itself. These injuries being the result of radiating fractures of the orbital vault and direct extension to the nerve. It is also possible to have injuries, as a result of these same disturbances, of the second, third, fourth, fifth, sixth and seventh cranial nerves. One or more or all of these nerves may be injured and we may have an atrophy of the optic nerve or a loss of motility and sensation or separation of the eye from its trophic nerve supply.

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(7) Jour. Mich. State Med. Soc., September, 1919.

The third law according to Lagrange is:

Injury to the facial bony structures, but not involving the orbit, produces lesion of the eye, by concussion, at the macular region. This was found to be the commonest cause of impairment or loss of central vision, but the type of fundus lesion is not constant.

In this type of case the disturbance is produced by concussion. The injury to the bony facial structure produces a vibratory wave which is transmitted to the orbit through the pterygomaxillary fossa and fissure. The eye is shaken just as a building is shaken by an earthquake. This type of injury is frequently located in the macula or macular region and may be explained as follows. The macular region being the most delicate and sensitive portion of the eye, is more liable to injury and secondly the posterior wall of the eye has attached to it the optic nerve which forms a sort of drag when the eye is shaken. The twitching or jerking motion produced by injury in this region produces ruptures or hemorrhages. In a small number of facial injuries there is produced a loss of central vision for which the ophthalmoscope shows no direct cause.

Lagrange's fourth law is:

Injury to the facial bony structures producing fracture of the orbit, with more or less depression of its walls, without striking the eyeball, produces two types of fundus lesion: macular and paramacular changes by concussion, and peripheral fundus lesions at site nearest the injury to the orbital wall.

This is a group of injuries in which we have macular changes as described under group three but there also exists chorioretinal lesions of varying extent resulting directly from the impact, and the extent and severity of the lesions is in proportion to the extent of the injury. This chorioretinal lesion is always situated interior to the orbital fracture. A wave starting from the fractured region shakes the soft tissues of the orbit and suddenly and violently strikes the eye rupturing the membranes at the point of contact. The rupture is chiefly of the chorioid and with hemorrhage; the blood detaching and rupturing the retina sometimes producing a proliferating chorioretinitis. It is evident, then, that this group contains two types of injuries: Macular injury, and chorioidal or chorio-retinal changes. These injuries were of quite frequent occurrence.

The fifth law is:

When the missile passes through the orbit without direct injury to the eyeball, it produces the same disorders as in group four, but with the addition of lesions resulting from laceration of structures of orbital cavity. Very often, the optic nerve is cut through, in which event the disc is lacerated, as if it had been pulled out.

This type contains the injuries of type four with the addition of direct injury to intraorbital tissues, and the type of injuries in addition to those described under group four can of course vary with the part or region of the orbit injured.

The writers add that Lagrange observed several cases in which the same bullet passed through both orbits and cut both optic nerves behind the eyeball. When the nerve has been cut or violently contused, we find marked injury at the posterior wall of the eyeball, the result of traction by the shock which the nerve suffered. The nerve when thus injured is naturally pulled by the missile, apparently, the missile trying to pull the nerve out of the eyeball and Lagrange has observed cases in which this actually happened. In other cases there is serious chorioretinal injuries often of proliferating type resulting from laceration of the optic nerve. In other cases the trophic nerves, the motor nerves or even the oculomotor muscles themselves may be cut.

Sixth law of Lagrange:

Mediate or immediate contusion of the eyeball by a missile grazing the globe tangentially without rupturing it, produces immediate disorders of the fundus at site of the impact, and the macular region is also the seat of lesions due to concussion. However, the peripheral and central lesions encroach upon each other; the eye is distorted, the area of destruction goes from the posterior pole to the peripheral region corresponding to site of impact.

When the eyeball is contused but not ruptured by a missile grazing it, we always find fundus changes at the point corresponding with the point of impact represented by the rupture of the chorioid and usually by rupture of the retina also. These lesions are extensive and usually radiate toward the macula. Thus the macular region is secondarily involved in these cases.

All visual changes resulting from war injuries can be explained by one or the other or by two or more of these laws.

To Lagrange's rules Sleight and Haughey add a seventh as follows:

Accompanying or following infectious diseases which have been prevalent in the army, we may have suppurative chorioiditis, papillitis or nerve atrophy.

Under this group are to be classed the various introocular changes that they have noticed in the military service. Suppurative chorioiditis occurs in meningitis cases and also occasionally in septic pneumonia. They have also seen nerve atrophy in meningitis. Under this heading would come albuminuric retinitis cases accompanying scarlet fever.

Among the twenty-five cases of meningitis which were under treatment at Field Hospital 33, there were six cases of suppurative chorioiditis following or during meningitis, developing at no particular period of the disease. The patients complained of very little pain, chiefly only of loss of vision. On examination there were found haziness of cornea, dilated pupil and in a few hours pus in the anterior chamber. In four of the cases only one of the eyes was affected and in the other two cases both eyes. In all of the cases except one an evisceration was performed with good results. In the case in which no operation was performed the eye became soft.

[See, also, the paper by Zentmayer, under *Sympathetic Ophthalmia.*—Ed.]

OPHTHALMIC THERAPEUTICS.

Action of Hypophysin (Pituitrin) on the Pupil. W. B. Inglis Pollock[8] after numerous experiments with this drug (extract of the hypophysis preserved with chloretone) found that when applied to the eye of the rabbit by instillation, it produces a mydriasis in about 94 per cent. of the experiments, although it is necessary in some cases to repeat the application several times. The effect is increased by decentralization and still more by deganglionation of the dilator pupillae or of the sphincter pupillae; and most markedly by deganglionation of both dilator and sphincter pupillae.

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[8] Brit. Jour. Ophthal., March, 1920.

When hypophysin is administered by intravenous injection, the local mydriatic effect is lost if the blood-pressure is raised, when a miosis occurs, due to central stimulation of the third cranial nerve, which relaxes with the return of the blood-pressure to normal, as shown for adrenalin in the dog by Elliott, and is followed generally by a slight dilation. The constriction of the pupil may be preceded by a brief dilation due to excitement at the moment of injection.

When the third cranial nerve is interrupted by section above the ciliary ganglion or by excision of the ciliary ganglion and accessory ganglia, the pupil dilates within a few minutes of the injection and generally returns to its normal size within an hour.

Hypophysin acts on the same structure as adrenalin, and since adrenalin acts on the neuro-myal junctions, hypophysin must also act there. Since deganglionation does not cause degeneration of the terminal plexus, the presumption is that both drugs act on this.

Flavine (Proflavine) in Ophthalmic Therapeutics. In a comprehensive statement of the value of this drug in eye surgery Arnold Lawson[9] reminds us that flavine is found on the market both as acriflavine and as proflavine. Acriflavine is the methylchloride of the organic compound diamino-acridine, whereas proflavine is the hydrochloride or sulphate of the same base, and is a preliminary product in the manufacture of acriflavine. Both are yellow dyes which are extremely potent antiseptics, but unlike other powerful antiseptics in common use, such as the phenols, mercuric chloride, and eusol, their bactericidal action is enhanced rather than diminished by admixture with serum. Further, they are comparatively non-toxic, both locally as regards the

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(9) Lancet, June 28, 1919.

tissues at the site of application and generally with regard to the body as a whole after absorption.

The antiseptic powers of acriflavine and proflavine are practically equal for *Staphylococcus* and *Bacillus coli*, but proflavine has proved to be the less irritating of the two when concentrated solutions were applied to the conjunctiva. On the other hand, similar effects only followed the application of proflavine when the solution was stronger than 1 in 50. Consequently, proflavine appears to be the preferable compound when dealing with the conjunctiva, although clinical observations have pointed to acriflavine being the superior of the two compounds in the treatment of gonorrheal urethritis and to have the more deadly effect on the gonococcus itself.

For general purposes in eye-work a solution of proflavine of a strength of 1 in 1000 in normal saline was adopted. This forms an exceedingly powerful antiseptic solution, relatively devoid of irritating and toxic properties, which will not be neutralized by admixture with serous exudate.

Using this solution of proflavine as a basis for clinical observattion, Lawson noted the following results in the treatment of (*a*) wounds and (*b*) inflammatory conditions of the eye.

The writer insists on the absolutely non-irritating effects of proflavine when applied to any wound surface, clean or otherwise. It is, moreover, absolutely painless to the most acutely tender eye when used of the strength just mentioned (1 in 1000).

Secondly, its efficacy is undoubtedly very largely dependent upon the continual application of the drug to the wound surface, and therefore it should be used in the form of drops, which are applied at least three times daily. He has found, however, that the solution of 1 in 1000 is unnecessarily strong for the purpose, in that after two or three days' continuous use a certain amount of irritation may under these circumstances appear in the form of a mild leukocytosis. A strength very much weaker—namely, 1 in 4000—will have just as good an antiseptic effect in clean wounds and can be continued indefinitely without causing the slightest disturbance. Another disadvantage of the more concentrated solution

(1 in 1000) is that after three or four days' use healing seems to be retarded. This is especially the case where healing is being carried out by granulation tissue, the granulations becoming weak and tending to be inert. If the proflavine is used of the weaker strength (1 in 4000) this interference with the healing process is not marked.

It will be said that intra-ocular operation wounds do not need the application of any antiseptic when the conjunctiva and lids are in a normal healthy state, and this is true. In no other part of the body is there so little tendency for wounds to "go wrong" as in the eye. Long before antiseptic and aseptic surgery were properly recognized it was noted that intra-ocular operations were less liable to mishaps from sepsis than any other wounds, and there is no doubt that this comparative immunity is due to the "protective" nature of the conjunctiva itself.

The use of flavine, then, is not to be insisted upon as a necessary routine for every operation. There remains, however, a large class of cases for which flavine has come as a most helpful adjuvant in treatment of wounds of the eye and surrounding parts. And Lawson emphasizes the point that flavine is to be regarded rather as an antiseptic than as a disinfectant—it is, in other words, to be used with the idea of preventing rather than curing sepsis. Unless one remembers this point in dealing with its employment in inflammatory conditions, there is apt to be misconception and disappointment.

There are essentially four classes of wounds in which Lawson found flavine of the highest value.

Firstly, wounds caused by foreign bodies, such as fragments of stone, dirty knives, dirty scissors—in fact, any wound other than operation wounds where due precautions to maintain asepsis have been taken. In the two years during which flavine has been employed the writer has not had one single case which has given rise to any trouble on the ground of sepsis, provided the case has come under early treatment—that is, before septic inflammation had already commenced.

Secondly, in all operations requiring the use of sutures flavine is, he says, invaluable. We all know the troubles that are apt to follow the insertion of sutures in advancement operations or tenotomies or, indeed, the retention of any suture involving conjunctiva for more than a very limited time. Before the advent of flavine the knotted ends of sutures could not be kept aseptic, for particles of lymph and mucus would cling to them in spite of the greatest care, and too often on that account some decomposition would set in necessitating the removal of the sutures at an undesirable date. Now all those troubles with sutures will vanish if flavine is dropped into the eye immediately after the operation, and its use steadily continued during the wound healing. Only, as said above, supposing the effects of flavine to be required for a week or so, a stronger solution than 1 in 4000 is not, in Lawson's opinion, to be recommended. The sutures will then remain absolutely clean and free from lymph, and there will be a total absence of all suture irritation.

Flavine (1 in 1000), and strips of gauze well soaked in flavine should be laid over the wound in *skin grafting*. This dressing need not be touched for several days. All that is necessary is to moisten the gauze pressing with fresh flavine from time to time. In the case of Thiersch grafts, where it is most desirable not to interfere with the graft for at least a week, Lawson prefers for the dressing itself the weaker solution of flavine (1 in 4000) rather than the stronger (1 in 1000), and have found it perfectly efficacious.

In inflammatory conditions of the eye, Lawson finds it harder to speak of the exact value of flavine than in the case of wounds, because its use as a disinfectant is much less pronounced than its power to prevent or limit sepsis. An inflammatory condition will be checked and its progress limited, but if of any severity it will not be cured by flavine. It is a remedy not to be relied upon for curing a conjunctivitis, and if it is used at all it must be in company with other means. Possibly because flavine has little power to penetrate the epithelial surface, it has only a very limited use in ophthalmia neonatorum and other kindred acute conjunctival disorders. Lawson believes it would prove to be of immense value in preventing the onset of gonorrheal ophthalmia and a far better and safer preventive measure than the use of silver nitrate in new-born babies' eyes.

In conjunctival inflammations, therefore, the usual remedies of zinc, silver nitrate and its allied protargol and argyrol, etc., are to be preferred to flavine, and the latter only to be used as an adjunct. The author is, however, distinctly in favor of flavine being used in addition to the usual remedies, because the effects of other remedies are enhanced by it, and because inflammatory damage to the tissues is limited by it. He refers particularly to the cornea, the protection of which is the most important point, and his method in ophthalmia neonatorum is to instil a drop of weak flavine (1 in 4000) after each irrigation of the eye—that is, every hour or every two hours, as the case may be—until the discharge is well in hand and the danger past. In some cases he found that this solution is too strong for frequent use for more than a couple of days. This is indicated by an increase in the amount of discharge which had previously abated. In such a case it must be discontinued entirely, but, as a rule, it is borne well for the few days necessary to remove all danger.

In corneal ulcerations, unless for some special reason, there is no advantage in the employment of flavine. It certainly does not aid healing and its only indication is the presence of an intensely virulent process such as is afforded by a hypopyon ulcer.

Thirdly, when operative measures are necessary in what is technically known as a "dirty" eye. Perhaps this point most frequently arises in cases of perforation of the cornea with extrusion of the iris and in a certain number of cases of acute congestive glaucoma. In both of these classes the danger of sepsis spreading to the wound edges, and so to the interior of the eye, is very sensibly diminished by the use of flavine at the time of operation and for a couple of days or so after operation. In such cases a solution of 1 in 1000 can be safely used and is to be preferred to a weaker one.

Lastly, in inflammatory conditions of the lid borders flavine will prove a very useful addition to our stock of remedies. Here, again, Lawson does not feel justified as yet in making positive statements.

He reports, however, that in one case of very severe relapsing blepharitis, in which every known treatment had been tried and which had been under almost continuous observation for over four years, an ointment made up with a simple base and proflavine oleate (1 in 1000), and rubbed nightly into the lid borders, had an extremely good effect.

Methylene Blue in Purulent Discharge from the Eye Socket. J. Hamilton McIlroy[1] draws attention to the fact that after an artificial eye has been supplied, the soldier has in many instances suffered from purulent discharge of the conjunctiva in the socket, particularly if the artificial eye has been worn for a long time, or has become rough and irritating for any reason. These sockets have proved themselves very difficult to treat; the ordinary methods of treatment, such as zinc sulphate, alum, or the silver preparations have been found most unsatisfactory.

Adams, in his monograph on the use of methylene blue in eye work, shows that the drug is of value in cases of conjunctival discharge due to the *Staphylococcus aureus*, the more usual lines of treatment having failed.

In the ophthalmic department of the hospital with which McIlroy is connected, methylene blue (1 in 1,000 saline solution) has been employed as the regular routine method of treatment in cases of discharging eye socket, and the results obtained have been so striking and satisfactory that they were led to inquire how the drug exercised its effect—whether there was a definite germicidal action, and if so, whether there was a selective action for one microörganism more than another. The present investigation was undertaken at the suggestion of Major Maitland Ramsay the clinical results having been observed by him in these wards over a lengthened period.

For the bacteriologic investigation, carried out in the pathologic department of the hospital, nine cases of purulent discharge from the eye socket were taken. They were not selected—save that they were illustrative cases in which actual discharge was present. Some had been under treatment with methylene blue for a time, but in none had the discharge completely stopped. Treatment was suspended in every case for twenty-four hours or

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(1) Brit. Med. Jour., April, 1919.

so in order that the discharge might be as abundant as possible without prejudicing the welfare of the patient. A feature of the treatment by methylene blue is that although the discharge vanishes after the drug has been in use for a comparatively short time, it is necessary to continue the treatment for a further period (say a fortnight) after the discharge ceases to be obvious to the naked eye, in order to prevent recrudescence.

In each case to be investigated, direct microscopic films were made, and agar slopes inoculated; the first step in the research was to find the prevailing organism in the conjunctival discharge. Agar medium was employed for culture throughout, and the results must necessarily be expressed on limited lines. The possibility of demonstrating the presence of microörganisms which flourish on different media is allowed for, but the finer points of research into the germicidal valency of chemical substances belongs to the expert bacteriologist.

The direct films made from the socket on microscopic examination were practically all negative, as is often the case in films of conjunctival discharge. The agar slopes were incubated for twenty-four hours. Well-marked growth was found in the case of two cultures only, and these were selected for further experiment. In all cases in which any growth appeared the prevailing organism was found to be *Staphylococcus aureus.*

Four Fatalities Following Use of Arsphenamine. These accidents, reported by Blanton,[3] followed an intensive course of arsphenamine treatment consisting of from four to six intravenous doses. There was an average interval of four days between injections; from 0.4 to 0.6 gm. arsphenamine were given at a time. Two days in three cases, and three days in the other case intervened between the time of the last treatment and the onset of the illness. The time elapsing between the admission to the hospital and death was two days in three cases and one day in the other. A striking similarity in symptoms, as well as in postmortem findings existed in all four cases. After a symptomless latent period of about two days, the development of sudden and profound coma was characteristic and dominated the clin-

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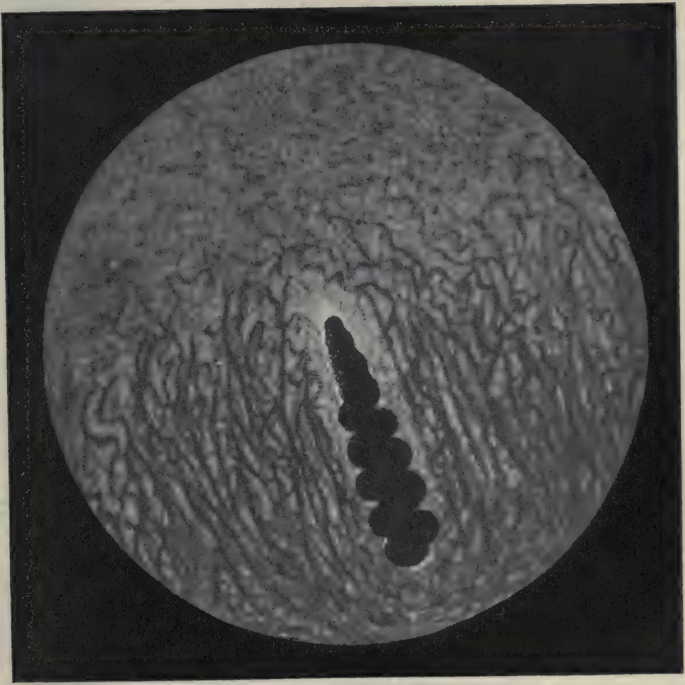
(3) Amer. Jour. Syphilis, October, 1919; abstracted in Jour. Amer. Med. Ass'n., Dec. 6, 1919.

PLATE XII.



The *fundus oculi* of the burrowing owl.—Wood, page 185.

ical picture so that it was difficult to elicit any focalizing signs at all. There were no cranial nerve palsies. The *pupils were dilated* in two cases; in two they were unaffected. During the last twenty-four hours of life the reflexes disappeared in all four cases. Two patients had convulsions. Cheyne-Stokes breathing was present in all cases and death was apparently due to failure of the respiratory center. Pathologic study of the brains of these four cases showed similar lesions, which consisted in minute hemorrhages, scattered through and confined to the basal nuclei and that part of the cerebrum bounding the lateral ventricles. These were associated with a softening confined to this locality and seen easiest on gross examination. Cerebral congestion and edema were marked. Increase of cerebrospinal fluid was not a conspicuous finding. In only one case was there a slight fatty degeneration of the liver. In Blanton's opinion the cause of these mishaps is undoubtedly to be found in the toxic by-products of arsphenamine synthesis, the exact nature of which is unknown.

[Considering the universal employment of this highly poisonous drug it is certainly strange that we do not encounter more cases of that amblyopia which we have long known to follow, now and then, administration of arsenical compounds. On the contrary, eye symptoms after the injection of arsphenamine, neoarsphenamine, salvarsanized serum, etc., are relatively rare. When they do arise they probably come as the result of what, in our ignorance, we style "idiosyncrasy against arsenic." In this connection, Latham[4] records a fatality following a therapeutic dose of arsphenamine, the equivalent of less than three grains of metallic arsenic. He adds that diarrhea, vomiting and nephritis were absent in all the cases of intoxication he witnessed and that in the fatal cases arsenic was found in every tissue examined postmortem.—Ed.]

Colloidal Manganese in Gonorrheal Ophthalmia. D. M. Livingstone[5] reports a number of cases of gonorrheal ophthalmia treated by gonorrheal vaccines in addition to the usual local applications. He regards the most

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(4) Jour. Amer. Med. Ass'n., July 5, 1919.
(5) Brit. Med. Jour., April 5, 1919.

dangerous period of the disease to be the time of intense edema of the lids when the bulging of the chemotic conjunctiva conceals most of the cornea. The epithelial covering of the latter is at this time most likely to be damaged by the attacks of organisms or their toxius while the nutrition of the parts is interfered with by the excessive swelling. Colloidal manganese seems to have a beneficial effect at this juncture by bringing about a rapid decrease in the conjunctival swelling. The drug is given daily by intramuscular injection in doses of 1 c.c. Improvement sets in after the second injection.

OPHTHALMIC INSTRUMENTS.

An Instrument for Improved General Anesthesia in Ophthalmic Surgery. Chas. T. W. Hirsch[6] properly remarks that in all operations the anesthetist is appreciated in proportion to his effacement. This is essential in eye work, where the fields of operator and anesthetist rather encroach on one another. In this, as in all anesthetic work, the general principles apply—that is, correct preparation of patient, preliminary narcotic, slow gradual induction, free air-way, and uniformity of anesthesia. Chloroform is the ideal anesthetic, unless there are special contra-indications.

Preparation of patient. Bowels to be cleared by medicine given on the second night before the anesthetic is administered, and enema on morning of operation. The last meal, five or six hours before the anesthetic, should consist of either broth, meat jelly, or soup free from fat. Milk is undesirable.

Preliminary narcotic. Hirsch prefers morphine $\frac{1}{12}$ gr. and atropine $\frac{1}{100}$ gr., given 20 minutes prior to operation.

Induction should be slow and gradual, eight to ten minutes. This can be obtained by the Schimmelbusch mask and drop bottle. The writer prefers a percentage inhaler, such as he described in the *Lancet,* April 1, 1916. A mouth prop should be introduced before starting induction. As soon as the patient is under, an air-way with a lateral tube should be put in, care being taken that the tongue is under the tube. If a prop has been

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(6) Lancet, June 21, 1919.

used this can be done without using a gag. The air-way, illustrated, is a modification of Hewitt's, but has a flat metal dental end, B, with a tube on either side for the attachment of the rubber connection from a Junker inhaler (Fig. 24).

When the patient is deeply under, the corneal reflex being almost abolished, the mask or face-piece can be removed. The anesthesia can be maintained by a hand or foot bellows pumping air through chloroform in the Junker inhaler and thus by a rubber tube to the lateral metal attachments on the air-way. One hand can be placed under the chin. A sterile towel loosely covers this as well as the patient's mouth and nose. If the anesthetist stands at the side the operator will have the whole field to himself.

The hand below the mouth will detect that the patient is breathing regularly. The color should be normal throughout. The slightest cyanosis is an indication to stop immediately the anesthetic, turn head to side, and drain or clear out any cause of respiratory obstruction. With proper preparation and preliminary narcotic this should not occur. As in all anesthetic administrations, but especially with chloroform, the slightest respiratory obstruction may be most serious. A free air-way and a good color indicate safety.

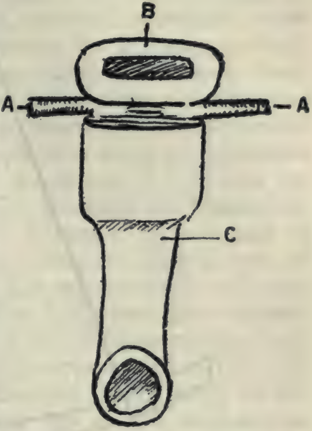

Fig. 24. A, Metal tube for attachment to Junker inhaler for general anesthesia, passing 1½ in. down air-way. B, Dental end. C, Dermatine mouth tube.

Ether can be used, and after the usual induction can be continued by either the intratracheal or Kuhn's tube. Or air can be pumped through ether in a Woulfe's bottle, warmed by passing through a coil in a thermos flask, and finally passed into the patient's mouth through the air-way's lateral attachment.

In lieu of the air-way a mouth prop with a tube perforating it can be used. The air-way is preferable as by it the tongue is kept from falling back.

A New and Simple Tonometer. Having experienced various difficulties with the instruments of Schiötz, Gradle, McLean, and Souter, E. J. Brown[7] has devised another tonometer.

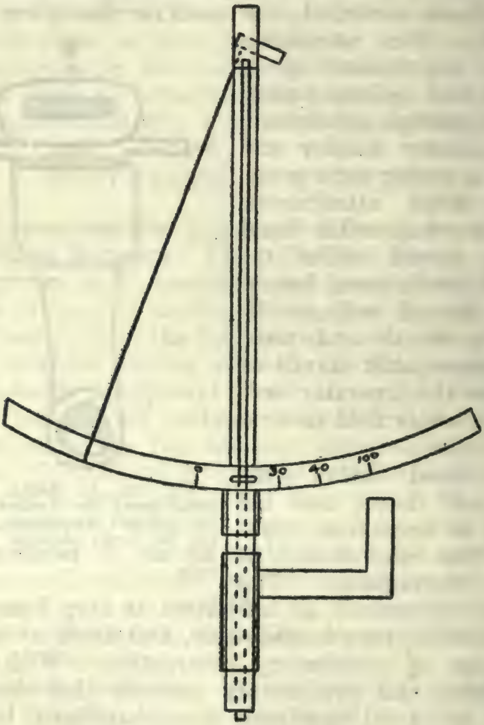

Fig. 25. A new tonometer.

The size of the foot-plate of the Schiötz and McLean instruments (10 mm.) made them difficult to apply to the cornea in a large number of cases; and the differences of corneal curvature, as well as the personal equa-

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(7) Amer. Jour. Ophthal., January, 1920.

tion of surgeon and patient, introduced elements which made the results too often contradictory and unreliable. The Gradle instrument has a smaller foot-plate (8 mm.), but like the Schiötz has a scale too distant from the foot-plate, and like the latter requires weights and the use of a table for determining the tension in terms of mercurial pressure.

Brown constructed an instrument on the principle of measuring and determining, in terms of mercurial pressure, the dent in the cornea made by a comparatively light plunger, while the 6 mm. slightly concave foot-plate descends to a contact with the cornea a distance of 2 mm. After using the instrument on a considerable number of patients and in comparison with the standard tonometers, he asked a skilled mechanic to make an instrument on the same lines, which is shown in Figure 25.

The scale was determined as follows: In one side of a large and substantial medicine dropper bulb a hole 10 mm. in diameter was cut and this was covered with two thicknesses of dental dam. The bulb was then slipped over the short end of a piece of heavy glass tubing bent at a right angle. The manometer was completed by adjusting a millimeter scale. Mercury being used at the different levels, 10, 20, 30, etc., up to 100 millimeters the instrument was easily tested and the scale determined. The instrument described seems to Brown more practical and more reliable than the other instruments in use, combining their good, without any of their bad qualities.

A New Perimeter Chart. Alfred Cowan[8] points that all perimetric and campimetric charts give readings in degrees, which show the extent of the field of indirect vision along the direction of different meridians. This is very well for the field of vision, and might be considered all that is necessary. But it may also be interesting to know, for clinical purposes, at once and without the necessity of mathematical computation, the actual size of the blind spot itself; just how much of the retina is healthy; or the size of the lesion or lesions in pathologic conditions causing loss of vision in a circumscribed area. With the thought that this can be actually de-

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(8) Amer. Jour. Ophthal., January, 1920.

termined in a practical way, the following suggestion for a new perimetric chart is made.

The irregular outline of the normal field of indirect vision is due to the obstruction caused by the brow, nose and cheek, its greatest extent being over ninety degrees below and to the outer side where there is not this interference. Knowing this to be so, we may suppose that were it not for this obstruction, the normal field of peripheral vision would be exactly circular in outline and extend about ninety degrees in all directions.

Taking twenty-two millimeters as the approximate diameter of the interior of the globe and presupposing that the entire surface of the retina is sensitive to form, we would have, if it could be spread out, a flat circular area, the diameter of which would correspond or be equal to its previous circumference, which is 46.0768 millimeters. This result is obtained after allowing the anterior segment, back to and including the ora serrata, to be equal to one-third of the circumference of the eye and deducting the same.

The retina is now in the form of a flattened circular disc with a diameter of 46.0768 millimeters, receiving form impressions from a field of 90 degrees from its center outward in all directions, or 180 degrees across the whole diameter. By this theory each degree in the field covers 1/180 of 46.0768 or about .25598 millimeters, approximately 0.25 millimeter.

To apply this for practical purposes and for convenience of reading, a perimetric chart is ruled with straight lines running both horizontally and vertically, spaced four degrees apart. These lines form squares over the entire field, each side being four degrees in the field, which would be equal to four times .25598 or 1.02392 millimeters on the retina. The old lines being allowed to remain, we now have two distinct systems:

1. Circular and radiating.
2. Vertical and horizontal.

The chart as now modified (Fig. 26) shows not only the visual field as before (circular system), but also represents a plan of the retina itself, divided into spaces, each being equal to an area on it of close to 1.026256 millimeters square.

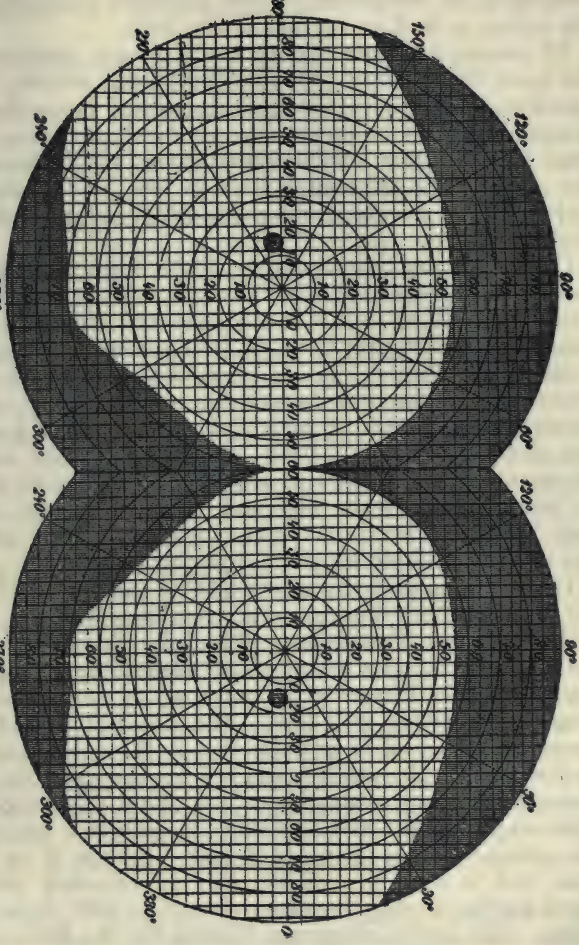

Fig. 26. Modified Chart for Recording Fields. The series of vertical and horizontal straight lines are placed at a distance equivalent to one millimeter on the retina.

Thus the fields are taken as before and the chart marked in the usual way, the difference being in the reading after completion, which indicates millimeters on the retina as well as degrees in the field.

Of course, all these figures are in round numbers and the scale is certainly not mathematically correct, being based on anatomic rather than on optical principles. It is nearly enough accurate for practical purposes. The final result varies very slightly when the diameter of the globe is one millimeter more or less, or the plane in which the ora serrata lies is pushed forward or backward slightly.

Cowan claims that a chart of the kind described is quite an improvement over the old. With its aid, we would be enabled to say at a glance and with a fair degree of accuracy, that the field is contracted so that only a certain portion extending over so and so many millimeters of the retina is functionating; or that the lesion causing a scotoma is of such and such size. In presenting papers describing these conditions, it will not be necessary in many cases to accompany them with charts as heretofore, but the size and location on the retina may be given, making a better picture on the mind's eye than is possible by the old method.

It is obvious that the above scheme may be applied to the charts of any instrument for taking fields.

The McLean Tonometer. The following advantages are claimed[9] for this instrument: The calibrations on the scale are in millimeters of mercury, as determined by actual manometer readings. The scale is placed just above the finger piece and as close to the eye as possible so that it may be easily observed by the operator. To prevent capillary attraction of any fluid that might remain on the cornea and to reduce friction to a minimum, the plunger has a space of 1 mm. between it and the base and is held in position by the rounded ends of three hardened steel bearings placed at 120° from each other. The limits of normal tension by the McLean instrument are 22 mm. Hg., the minimum; and 40 mm. Hg., the maximum, although the author states that he saw a few eyes with a tension of 36 mm. Hg., which had

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(9) Amer. Jour. Ophthal., May, 1919.

symptoms of glaucoma. In a case of absolute glaucoma, before enucleation for pain, the tension was Schiötz 40, McLean 58.

COMPARATIVE OPHTHALMOLOGY.

The Eyes of the Burrowing Owl. Casey Wood[10] has contributed a paper on this subject in which he points out that of all the *Strigiformes* there is none so interesting from the standpoint of the visual apparatus as that widely distributed New World group—the Burrowing Owls. These birds are found (as the typical species, *Speotyto cunicularia*) throughout the pampas regions of Central South America and occasionally farther south; and are well known, as a subspecies, in Florida (*Speotyto c. floridana*), the West India Islands, and on the plains and in the valleys of North America (*Speotyto c. hypogæa*) as far north as British Columbia.

It must be remembered that while the great majority of these owls dig their own burrows, many of them, especially the northern varieties, make use of the abandoned holes of certain mammals, notably of the prairie dog, fox, badger, skunk, and ground squirrel. Doubtless in the latter instances the burrowing owl may enlarge or otherwise alter the size, length, and other dimensions of the newly acquired hole.

The writer has studied the habits of the North American and Florida subspecies, with special attention to the eyes and eyesight of the bird. From these observations he concludes that this owl, like all the others, is a *true night bird,* adapting itself with but slight success to daylight conditions. The owls possess a single, deep fovea encircled by a round, sharply defined area located above and on the *temporal* side of the optic disc. This arrangement closely approaches the binocular maculæ of man.

The writer gives to the owls a class by itself in describing these areæ and affirms that the temporal *monomacular fundus* is found almost exclusively in the owls.

In conjunction with Arthur W. Head, F. Z. S., the South American burrowing owls in the London Zooiogical Gardens were closely studied and examined with the ophthalmoscope. In addition, the interior of the eyeball both of that type and of several North American individuals were examined by the writer in prepared specimens.

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[10] Osler Anniversary Volumes, p. 818, Vol. II, 1920.

The ophthalmoscope in particular shows the fundus oculi of *Speotyto cunicularia* to be that of a typical nocturnal animal. The details of this bird's background, although not its bright orange coloration, is well shown in the accompanying plate, painted by Head (Plate XII). The *ocular fundus* of this species is irregularly round, as in all the owls, and in prepared specimens these details show distinctly.

The single, temporal, oval *macular region* lies above and about a disc length and a half from the upper end of the papilla. In the center of the macula is the fovea —a dark pigmented spot with fine granules arranged cap-like above it. Outside this, again, is the ovoid circumference of this region, incompletely edged with fine dots. These are more numerously distributed below the macula than above it. Connected with the macular region is a light-colored and rather broad band that extends horizontally to the center of the visible background. It is unevenly divided into two strips by a parallel arrangement of minute pigment dots.

The Ear

ALBERT H. ANDREWS, M. D.

Translations by
SAMUEL SALINGER, M. D.

DISEASES OF THE EAR.

RELATION OF OTOLOGY AND GENERAL MEDICINE.

The Relation of the Physician to Otology. In discussing this subject, H. Newhart[1] states that the attitude of the average practitioner toward the subject of otology after graduation, or as soon as he finds compensating work in other lines, is usually one of passive indifference, if not one of confessed helplessness or even boasted ignorance.

That the general practitioner is not enthusiastically interested in otology is due largely to the failure of undergraduate schools to provide adequate instruction in this subject, with the result that the graduate in medicine is insufficiently prepared to cope successfully with even the ordinary ear disorders which fall very properly within his province. Another factor which has made otology unpopular has been the almost universal tendency of the laity and the profession to neglect all but the most obvious or painful ear affections, until it is too late for even the specially trained otologist to handle them with any possibility of securing brilliant or satisfactory results. This tendency to neglect the ears is almost as common among the intelligent and well-to-do as among the indigent.

How poorly the profession has succeeded in the practical application of the first principles of modern otologic teaching and how great is the need for an awakening of interest in the subject are convincingly proved by the prevalence of ear diseases and the consequent impairment of hearing which exists at the present time.

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(1) Journal-Lancet, April 1, 1920.

The responsibility for the prevention of ear diseases, in common with all other beneficent movements for health reform, rests primarily with the medical profession, and this responsibility falls with much greater weight upon the man in general practice than upon the otologist; for it is the former who, through frequent and intimate contact with the many, is alone in a position to give help and advice at the time when it will be most productive of results.

While public interest has for a long time been actively concerned in the conservation of vision, and nearly all of the states have laws to prevent ophthalmia neonatorum and to safeguard the eyes against carelessness in industrial plants, and there exist numerous societies to promote the welfare of the blind, there has been a conspicuous absence of organized effort for the prevention of ear diseases, and until recently no specific steps have been taken in this direction. But we must acknowledge with pride the liberal provisions which have been made for the education of the deaf.

The situation as regards the prevention of deafness, however, is rapidly changing. The concern of all classes has of late been aroused as never before to the need of bettering the physical condition of the individual; and in this fact lies our chief hope for a speedy improvement in the situation as regards the conservation of hearing.

In the discharge of his obligations to the public in the field of otology, the medical man must help to combat certain popular fallacies regarding the ear, some of which, unfortunately, lurk as superstitions in the minds of not a few of the profession itself.

We refer among other things to the prevailing attitude toward operations on the mastoid. Many lives are sacrificed annually because of a traditional, but groundless, fear as to the results of such operative procedures. The indications for operation are now so well understood that, both to avoid complications and to preserve the maximum of hearing, when once the conditions demanding operation are recognized, no time should be lost.

The almost universal neglect of chronic suppuration of the middle ear may be regarded as a serious indictment of the intelligence of the physician as regards his comprehension of modern views on the surgery of the ear. It is a well-established principle that, with but few exceptions, every chronic suppurating ear which does not yield in a reasonable time to careful treatment should be given surgical care in the form of a radical or some modified form of the radical mastoid operation, but only at the hands of a skilled aural surgeon. The operation thus performed involves so little risk that this is negligible compared with the ever-present danger from endocranial complications, the certainty of a progressive loss of hearing, and the possibility of serious remote effects from the focal infection within the temporal bone.

The writer sounds a note of warning against the possibility of overlooking two very dangerous aural conditions which may escape diagnosis until autopsy. One is a chronic suppuration of the attic, which may exist with but few symptoms. The hearing is often well preserved, the discharge is usually so slight that the patient is unconscious of its presence, and the only otoscopic evidence of its existence is a small defect in Shrapnell's membrane covered with a minute quantity of pus or with an accumulation of scales of dried purulent discharge. This form of middle-ear suppuration is a frequent cause of brain abscess or meningitis. The other condition we may designate as a latent or occult mastoiditis which is prone to occur in epidemics of perforative otitis, with pneumococcus, or the *Streptococcus mucosus* as the predominate microörganism. In such cases, the middle-ear suppuration has run its course, the discharge has ceased, and the perforation is healed, but the drum-head is slow in clearing and its luster is absent. The hearing may have shown decided improvement. The patient complains of a vague discomfort in the mastoid region, possibly has a unilateral headache, and deep palpation often discloses sensitive points over the mastoid process. The *x*-ray usually gives positive evidence of disease within the bone. Such cases call for early operative interference.

This article does not advocate that every man in practice should qualify as a specialist in otolaryngology. It does, however, suggest the question: To what extent may the general practitioner invade the special field of the otolaryngologist? The obvious answer is that the man in general work, if he would meet the urgent needs of his practice and discharge his just obligation to the public, must be prepared to give better service in the line of otolaryngology than in the past. His activities, however, must be strictly confined within the limits of such procedures as he is qualified safely and intelligently to perform, and should never be extended to the point of assuming responsibility beyond his skill. Moreover, the scope of his work must depend in each case upon his individual training and upon the geographical location of his practice as regards accessibility to men of more highly specialized training than he himself possesses.

The passing of ear diseases and of deafness within the life period of one generation can not be hoped for by even the most enthusiastic optimist, but, through a generous coöperation on the part of the general practitioner and the otologist, and the utilization of every educational and other agency engaged in a crusade for better hygienic conditions, we may well hope to see within a single decade a great reduction in the number of those destined to be afflicted with ear disorders.

Knowledge of Ear Diseases. After describing four cases in which apparently wrong advice had been given patients regarding their ear trouble, G. E. Shambaugh[2] makes a plea for the better training of otolaryngologists. He states that the country is literally flooded with practitioners who have found a lucrative field of work in doing operations on the nose and throat, but who have had no fundamental training in otolaryngology which has prepared them to make the proper examination or to diagnose the conditions requiring these operations. For years general practitioners have been going to city clinics, especially to the so-called postgraduate schools, with the sole object of learning the technique of a few

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(2) Jour. Amer. Med. Ass'n., April 10, 1920.

operations on the nose and throat. It has been proverbial that these men have not been interested in learning the principles of otolaryngology. Diagnosis has not especially interested them. They came to get a smattering of technique for a few operations. This they could get in a few weeks, whereupon they returned to their practice to begin doing these operations on their patients. It is not surprising that the wrong advice is so frequently given, or that so many unnecessary operations are being performed.

The remedy for this state of affairs is equally clear. The representative otolaryngologists throughout the country should insist that the practitioners who come to them for instruction should first acquire a knowledge of otolarynology before they are taught to do operations in this specialty. Otolaryngology is not such a difficult subject that it requires a genius to master its principles. On the other hand, these principles can not be acquired by a few weeks' or a few months' attendance at post-graduate clinics. A physician who is preparing to practice otolaryngology should spend as a minimum one year of full time work in the study of this subject. His work during this year should be as much in the study of the fundamental sciences of anatomy, embryology, physiology and pathology as in the study of the clinical aspects of the subject. It does not suffice that he assist in a clinic during this year, where the chief work is the removal of tonsils and the correction of irregularities of the septum. His reading should be directed, and assistance should be given him in learning to make diagnoses and to understand the proper indications for operative treatment. The technique of operations should be taught only as the final part of such preparation. It is a relatively simple matter to teach a student the technique of operations. It is a difficult problem to teach the methods of examination and the making of diagnoses. The situation throughout the country does not call so much for a large number of men to do the work in otolaryngology as it does for the adequate training of only a relatively small fraction of the men who are at present attempting to take care of this work.

HEARING AND DEAFNESS.

The Deaf Child in its Relation to the Parents, the Teacher and the Physician. This is the subject of a paper by Emil Amberg.[3] He believes that lip reading should be taught to all persons who are unable to hear the whisper six feet away with at least one ear. His conclusions are:

It is necessary that the general health of deaf-mutes be closely watched.

Special attention must be given to the eyes, to the throat, to the ears, and to the lungs.

Each parent must be a teacher for the deaf child as soon as it is noticed that the child is deaf.

The parents must continuously be considerate and kind to the deaf child. They must especially cultivate the speech of the child who is only hard of hearing, and coöperate in every way with the teacher in its education.

The parents of deaf children should be especially interested in procuring the proper facilities for the teaching of their children.

Lip-Reading Acquired by Adults. E. B. Kessler[4] calls attention to the fact that inasmuch as the ability to read the lips often means the difference between happiness and despair, it is unfortunate that the value of speech-reading is not better appreciated. Many hard-of-hearing adults are living less normally than they need to, simply because they do not know that the eye can be trained to interpret speech movements as the ear interprets speech sounds. Others are too indifferent to apply themselves to anything that requires study. Then, too, a considerable number who have ambition to become lip-readers are not allowed by their own families to take the necessary instruction. If lip-reading were fully appreciated, no one would ever dissuade any deaf person from making a study of the subject. Instead, it would be considered a matter of conscience to urge him to do so, for anyone who is hard of hearing at all is deaf enough to use lip-reading to advantage.

"God never closes a door without opening a window."

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(3) New York Med. Jour., May 29, 1920.
(4) Nebraska State Med. Jour., July, 1919.

He is indeed fortunate who directs his attention toward the "open window" as soon as it is known that the "door" is beginning to close. It happens, however, that lip-reading is generally taken up as a last resort, long after the otologist has found that the hearing can not be restored—and after all unscientific remedies recommended by relatives have inevitably resulted in failure. Consequently progress is made more slowly than if the study had been taken up before losing courage, and while still under the doctor's care. It has been felt that the recognition of the value of lip-reading on the part of the public would eventually lead to its inclusion in the regular course of study of schools and colleges.

Lip-reading strengthens the morale, and the earlier it is mastered the less difficulty is experienced in bringing about the readjustment essential to the well-being of all whose hearing becomes impaired in adult life.

Deafness is no respecter of persons, and lip-reading is for all who are hard of hearing. Records show that factory workers, laundresses and housemaids, as well as men, and women in business and the professions, have become adjusted to their handicap with the aid of lip-reading. Not all can acquire the same degree of proficiency, but all can be helped, for instruction can be adapted to the individual's mentality and cultured background.

THE MIDDLE EAR.

Otitis Media from the Standpoint of the Pediatrian. This subject is discussed by L. T. Royster.[5] He classifies the cases as he has seen them during the recent epidemics of influenza as follows:

1. By far the commonest type is that which shows a generally red drum, with or without bulging, accompanied with fever, and sometimes pain; which on being incised promptly discharges a purulent, mucopurulent, or either of these with bloody fluid. This may discharge for from twenty-four hours to several days and then

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(5) Southern Med. Jour., January, 1920.

stop. The drum heals promptly, returns to its natural bluish-gray color and the complication is ended.

2. The case which on opening does not heal in so short a time, but gradually drags on to a course of prolonged chronicity. In many of these cases the mastoid cells are undoubtedly involved, either from the beginning or as a secondary infection. Some of these ears eventually heal, while others continue to drain until the mastoid cells are thoroughly cleaned out.

3. The type in which the middle-ear infection is followed very rapidly by acute mastoiditis. This often occurs in spite of prompt incision of the tympanum with early drainage. These are the ears which are most apt to cause the serious cases of acute mastoiditis. Some observers lean to the opinion that such cases are in reality primary involvement of the mastoid cells, the inflamed drum occurring secondarily to the mastoid infection.

4. A type which Royster has never seen except during the epidemic of influenza presented a red bulging drum which, on incision, emitted a single drop of thick tenacious glairy mucus, resembling grape pulp or cooked tapioca. This was expelled with evident force. In every instance of this kind on examination the following day the drum was found to be perfectly normal in appearance, even the incision having healed.

5. A type which is comparatively common is the drum which is red and not bulging, and appears on inspection very much thickened. Its appearance is best described as that of red parchment. On incision, these drums either bleed freely, scantily, or not at all, but show no evidence of discharge of pus or serum. These cases differ a great deal in their course. In some instances, the incision is closed by the next day; in others it may remain open for a long time. Sometimes the drum remains red and thickened in appearance for days and weeks; or it quickly loses its inflamed appearance, but becomes a dull white, which, with the evident thickening, gives one the impression of white parchment. The general tendency in these cases is toward chronicity. Whether these are cases of inflammation limited to the drum itself—true myringitis—or are a part of a general

middle-ear infection without pus, Royster is not prepared to say. Most of them clear up promptly with the removal of the adenoids.

6. A type which Royster never saw before the past winter is the red drum with bulging, which on being incised is accompanied by an escape of air or gas, under pressure, with a distinct hissing sound. There was no purulent discharge in the two or three cases of this type.

7. Still another type, which he never saw before the past winter, shows what appears to be a generally inflamed drum with bulging over a limited area. This bulging, however, proved to be a bleb on the membrane, the underlying portion of the membrane remaining intact.

8. Another type which Royster has never seen, but which has been described several times in literature in the past few years, shows fever, a thickened drum, but one which is not red. On incision these drums discharge pus.

Mastoid involvement during the past epidemic of influenza was conspicuous by its rarity.

Acute Middle-Ear Infections in Children. L. E. La Fetra[6] discusses this subject from the standpoint of the pediatrician. Routine examination will frequently reveal the ear inflammation before the baby has shown any manifestations referable to the ear by the mother or the nurse.

As to symptoms, complaint of pain in the ear, if present, is of course important; but young infants do not well localize their pains, and frequently a baby will cry and put the hand on the abdomen, and complain of pain in the stomach, when examination will reveal a bulging drum as the cause of the pain. Rolling the head or putting the hand to the ear are suggestive, but often they have no significance. Absence of any complaint of pain or even of general restlessness is no proof that the ear is not inflamed. Temperature elevation is nearly always present, but this also, like pain, may be absent even when the drum is bulging. Tenderness in front of the ear is a very reliable sign, but this

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(6) Jour. Amer. Med. Ass'n., March 1, 1920.

too is occasionally lacking even when there is high temperature and bulging of the drum. Moreover, many children deny tenderness, in spite of the involuntary wincing of the mouth. Stiffness of the neck is occasionally present even without enlarged lymph nodes under the mastoid muscle and without mastoiditis. To sum up the indications of middle-ear disease, a bulging drum is the only diagnostic sign. On examination, retraction of the drum and in addition some redness is frequently the first sign of inflammation in the rhinopharynx, and often confirms a suspicion of acute rhinitis as cause for fever up to 102° or 103° F. when there is as yet no running or stuffiness of the nose. The next sign of ear involvement is some redness along the malleus, and the next, some fulness and redness of Shrapnell's membrane. These signs are present so commonly with head colds in children, and subside so readily, that this small degree of otitis can be considered a very common accompaniment of acute rhinitis.

The next signs that appear mean an otitis media, namely, redness and bulging of the drum membrane, first behind and later in front. Occasionally the drum looks only gray, owing to thickened epithelium, which must be removed to get a view of the drum itself. The retraction meanwhile increases, and the appearance of the drum is that of a small red ring or doughnut. When accompanied by a high temperature, these signs are sufficient justification for incision of the drum; but by far the larger number of such cases will subside in a day or so if the nostrils are treated by a weak epinephrine solution, and hot irrigations of the ear are employed. Most otologists incise such drums, and the practice is undoubtedly a good one, for such an ear will frequently return to normal more quickly after being incised than if not opened.

The paracentesis should be done under anesthesia, preferably chloroform, though an exception may be made to this rule if the patient is an infant and only one drum is to be incised. The incision should be a J or U shape, and should be carried well upward. Irrigation with hot boric-acid solutions immediately after incision is of advantage, and it is always satisfactory to hear the child gulp or swallow during this irrigation, as this shows a free opening through the drum, with passage of the irrigation fluid into the throat. The temperature, the pain, the tenderness in front of the tragus, and the tenderness of the tip of the mastoid —if that has been present—should all subside after two or three days. It is quite common, however, for the temperature to remain elevated until the discharge becomes purulent. This may be two or three days after the incision.

During the month of January, 1920, there were in the children's wards of Bellevue Hospital 248 admissions; eleven patients had primary otitis media and thirty-one had otitis secondary to other conditions, mostly of the respiratory tract. There were among these respiratory conditions seven cases of bronchopneumonia, six of bronchitis, four of acute pharyngitis and two of lobar pneumonia. During the year 1919, there were only two cases of mastoiditis among 400 cases of otitis media. It is a common observation that in cases of bronchitis or bronchopneumonia the complicating otitis media occurs usually from four to seven days after the onset of the primary disease. Often in cases of bronchitis the ear will become involved after the temperature of the acute bronchitis has subsided to normal. In these cases it is probable that the continued coughing of the early convalescent stage causes an infection of the Eustachian tubes.

The otitis that complicates measles is far more likely to result in mastoiditis than we have been taught to believe, and is almost as serious as the otitis complicating scarlet fever.

The chief reliable sign of mastoid inflammation is sagging of the posterior superior quadrant of the drum with the adjacent wall of the canal. Tenderness above the tip on a line directly behind the meatus at the site of the mastoid emissary vein and tenderness of the upper part of the mastoid in the region of the zygoma are very important if they can be elicited. Other suggestive signs are a profuse discharge or the sudden cessation of a profuse discharge. In little babies, and occasionally in older children, edema over the mastoid process is important. It should be emphasized that vacillations of temperature without the canal signs are not reliable, though if these temperature elevations are continued and unexplained by pneumonia, pyelitis or by gastro-intestinal disturbance, they must be regarded as pointing to mastoid involvement. If successive blood counts show an increase in the number of polymorphonuclear cells and in the total leukocyte counts, they are also valuable; but single blood counts are of little importance since the blood in children is susceptible to a polymorphonuclear and total leukocyte increase.

The indications for the mastoid operation are a persistence of the signs already mentioned, in spite of free drainage through the wide incision in the drum. It is manifest that if the inflammation is not subsiding there must be increasing destruction of the mastoid cells, and the only method of cure is by posterior drainage through the mastoid bone, together with clearing out of all the cells and bony tissues that are infected.

The author's plea to the general practitioner and to the pediatrician with regard to ear infections in children is that careful routine examination of the ears be made in all cases in which fever is present. It can not be emphasized too often that to the man who treats children, the otoscope is just as necessary as the stethoscope.

Primary Diphtheria of Middle Ear. According to A. Pugnat,[7] diphtheria may localize directly in the middle ear, without being preceded by angina or rhinitis. It gives rise to acute otitis media, with febrile manifestations, characterized by the following triad of symptoms: Bulging of the tympanum as a whole or one of its quadrants; serous, serohemorrhagic, or hemorrhagic secretion, sometimes containing whitish clots formed of necrosed fibrin; earache, always very acute, which is not relieved till after injection of antitoxin. Mastoiditis is a frequent complication. The prognosis is relatively good, provided the affection be recognized from the start.

Middle-Ear Disease After Influenza. In the aural complications of influenza in the recent epidemic, E. B.

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(7) Presse méd., June 5, 1919.

Dench[8] emphasizes the importance of early recognition, but protests against lack of discrimination in opening the membrane.

We have two general symptoms indicating aural inflammation, namely, high temperature in infants and pain and high temperature in adults and older children. These are the two general symptoms for which the general clinician should be on the alert. There is one danger to which these patients are subjected in any epidemic, and that is to the rather too great tendency on the part of the general clinician to attribute a rise in temperature to an aural lesion without having the aural lesion adequately confirmed by sufficient physical signs. It is surprising to hear some men of very wide pediatric experience tell of the number of cases in which they have performed myringotomy during the present epidemic. Unfortunately, they have been inclined to attribute too much importance to slight physical changes in the ear, that is, a slight congestion of the tympanic membrane associated with a rise in temperature has in their minds always demanded an immediate myringotomy. In some of these cases myringotomy has been delayed and we have found that the rise in temperature was not due to a middle ear inflammation, although there was a mild middle ear inflammation present in these cases, but to a pulmonary lesion which early in the disease could not be made out by physical examination, but which became perfectly evident later. The ear actually inflamed and demanding myringotomy presents such unquestionable evidence of a severe inflammation that an error can not well be made as to the necessity of the procedure. We must remember, however, that in any general disease affecting the upper air tract a mild otitis with slight congestion of the drum membrane is not unusual. It is just these mild cases which are misleading and which must be watched carefully, and myringotomy must be performed when it is actually indicated. The intensity of the infection is evidenced in children by temperature elevation. This temperature elevation almost invariably agrees with the physical signs present, that is, if we have

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(8) New York State Jour. Med., July, 1919.

a severe infection of the middle ear as evidenced by a very red and bulging drum membrane, the temperature will be high. This is systemic infection. On the other hand if we have slight congestion of the drum membrane, although there may be considerable fluid in the tympanic cavity and a high temperature, it is better to delay myringotomy and to search thoroughly in the chest for some cause of the fever, rather than to incise the drum membrane when the physical examination seems to show only a mild inflammation.

Classification of Otitis Media. Chronic purulent otitis media is divided by C. R. C. Borden[9] into two classes. In the first class may be placed the type of running ear in which the discharge is continuous. In the second class may be placed that species of running ear in which there are periods of purulent discharge followed by periods in which the discharge ceases.

In Class I (continuous discharge) the process of inflammation has usually injured the vital structures to such an extent that Nature alone is unable to repair the damage. This type is usually complicated by the presence of bone necrosis or by cholesteatoma, two factors which are fatal to recovery by the processes at Nature's disposal. In general, continuous chronic purulent otitis media may be considered to comprise all forms of chronic purulent diseases which have been present for a long period of time, and which fail to respond to scientific local treatment and to minor surgical methods. Furthermore, it may be truthfully stated that such cases will not be cured permanently except by radical surgical treatment, such as ossiculectomy or radical mastoid exenteration. Occasionally, a few cases will respond to some newly tried local treatment. When this occurs, it does not signify that cases of the first division can be cured by simple measures, but that certain apparently hopeless cases which are believed to be of division one, really belong to the second division.

The connection between the nose and throat and middle-ear suppuration is so vital that, in many instances, success within the middle ear can be obtained only by proper diagnosis and treatment of pathologic

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(9) Amer. Jour. Surg., May, 1920.

conditions within the nose or the throat. In children subject to earaches or acute infections of the middle ear, the cause is usually found to be swollen or infected adenoids. This is the simplest and most easily demonstrated example of the influence of the nose or nasopharynx on the middle ear. In adult life, the nasal septum is probably the structure which most influences the middle ear. Nature intended this partition to be relatively straight. If the septum is bent or crooked, one or both ears are very apt to suffer. Uneven air passages in the nose produce altered air currents, which upset the entire mechanism of the breathing apparatus. Such a disturbance produces inflammatory reactions in the Eustachian tube, and eventually injures the cavity of the middle ear.

Acute and chronic diseases of the nasal accessory sinuses are frequent causes of ear complications. These diseases are widespread. They vary from simple acute inflammations to marked necrosis of the tissues. Affections of the sinuses of the nose almost invariably involve, to some extent, the Eustachian tubes. Acute disease of the antrum, of the frontal sinus, or of the anterior ethmoid cells is not difficult to diagnose or to treat. Chronic diseases of the nasal sinuses are much more difficult. They are so frequently present that the aurist should be able to determine their presence, and should possess adequate apparatus to make a scientific diagnosis.

The faucial tonsils, when diseased, exert a powerful influence on the middle ear. In every case in which aural disease is present, the tonsils must be given careful consideration. No definite information regarding the condition of the tonsils can be obtained by inspection alone. The tonsils are so covered by the pillars of the palate and the plica triangularis that little can be seen of them in many instances. To examine properly these important organs, it is usually necessary to push the anterior pillar backward with a suitable instrument. Another method to bring the tonsil into view is to insert a hook of some kind into a tonsillar crypt and draw the tonsil into the fauces. Firm pressure exerted on the anterior pillar will often cause cheesy debris to ooze from the crypts of the suspected tonsils. One, or all three of these methods should be used in the tonsillar examination in every case in which middle-ear disease is present.

Middle-Ear Suppuration Resulting from War Conditions. This article by H. Smurthwaite[1] has the purpose of calling attention to the large number of chronic suppurative ears in England, and to urge that everything possible should be done to lessen it. A man with ear disease loses from 10 to 70 per cent. value in the labor world.

A large and increasing number of cases is now coming under his notice originating in rupture of the drum by high explosives and secondary infection of the middle ear, which, for lack of continuous and expert treatment, have become chronic. The drum was torn by the terrific concussions of high explosives, and though the man escaped all other injury he was so dazed that he did not notice that he was deaf, and possibly had some slight bleeding from one or the other ear. A day or so later, there was pain in the ear and a slight mucopurulent discharge. In other cases there was no pain in the ear and only a slight discharge, and the men, thinking it only trivial, did not complain until it became profuse and was accompanied by marked deafness.

There are many trades in which good hearing is indispensable. Miners have told the author that they can not get work down the pit on account of loss of hearing, because they may fail to hear sounds in the pit which portend disaster or death to themselves or their comrades. The same thing applies to many other trades, and the man has to seek other work, each succeeding class of work is more precarious for him, and he is finally driven to casual labor. The poorer classes take but casual notice of the condition of the ear, and this applies especially to suppurative otitis media. Pain is not a frequent concomitant, otherwise they would oftener seek advice.

If by propaganda the poor and so-called working classes could be taught to look upon their hearing as

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(1) Brit. Med. Jour., April 2, 1920.

precious, and realize that a ''running ear'' may lead to the loss of earning power and calls at the earliest onset for advice, the efficiency of the nation in general would be increased.

Chronic Otorrhea. The large number of individuals afflicted with chronic otorrhea, its general dissemination and the serious potential menace which it holds to audition and even to life, according to H. B. Blackwell,[2] render this subject of wide interest. The observations may be considered as applied to patients with chronic otorrhea on whom a major ear operation, *e. g.*, radical mastoid, is, for various reasons not indicated, inadvisable, or postponed to await the outcome of a thorough course of treatment. The term treatment is intended to include all necessary operations of a minor nature on the ear, nose or throat and non-operative cases are only those in which a radical mastoid operation is not indicated.

When considering any remedial measures for chronic otorrhea, we must bear in mind its possible effect not only in stopping the discharge but also upon the patient's hearing. In the non-operative cases this is especially true, as usually the hearing is quite good and becomes the main question at issue, at least in the eyes of the patient, who often regards the discharge as of little or no consequence.

If it were possible to sum up in a phrase the treatment of chronic otorrhea it should be ''aëration of the middle ear.'' The tympanic cavity should have free access to the air, both externally and by way of the Eustachian tube. Granulation tissue when present in the canal in the form of aural polyps must be removed as preliminary to any treatment. When the middle ear appears to contain granulation tissue, alcohol may be instilled into the canal at the conclusion of the cleansing and the head held on the side for a few moments until it can act in the tympanum. If the perforation in the drum head be sufficiently large, applications of silver nitrate of mild strength to the tympanum may be beneficial. The auditory canal must be kept free of pus and dry at all times. When the dis-

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(2) New York Med. Jour., Dec. 6, 1920.

charge is profuse this can be accomplished by irrigations. Boric acid is best for this purpose, a rubber ball syringe being used with only two ounces or so of solution at each irrigation, and repeated as often as necessary to free the canal of pus. At the conclusion of each irrigation the canal must be thoroughly dried. Absorbent cotton should never be worn in the meatus except in the most severe weather, and as the discharge diminishes the number of irrigations can be lessened, until finally as it becomes comparatively scanty they should be terminated. At this stage the pus is best removed from the canal by means of a cotton applicator, and as it is not usually feasible for a patient to receive the constant attention of a physician or nurse it can be effectively performed by himself in the following manner:

A small bit of absorbent cotton is tightly twisted about the square end of a match, thoroughly covering and protecting the sharp corners and edges. The arm opposite the affected ear is passed over the head and with the same hand the edge of the auricle is grasped and pulled upward and backward, the other hand carefully inserting the cotton wound end of the match down to the bottom of the canal, rotating it gently. This procedure should not be accompanied by pain and a few demonstrations will convince the patient of its safety. The capillary attraction of the fibrils of the cotton will not only free the canal of moisture, but the middle ear as well. It should be repeated as often as necessary to dry the canal.

Aëration of the middle ear by way of the Eustachian tube is quite as important as external aëration. The author does not believe in the practice of closing the Eustachian tube when treating these patients; he would recommend that procedure only when the radical mastoid operation is performed. The best functional and surgical results he believes are obtained by retaining the patency of the tube. Occasional inflation of the tube may be practiced. Deflected septa sufficiently marked as to cause nasal obstruction should be corrected. Nasal polyps if present must be removed; all diseased conditions of the accessory sinuses of the nose treated, and, if necessary, operated on; enlarged or diseased tonsils should be removed, together with adenoids if any exist, particularly in the case of children, and the nose should be perfectly free and clean.

Persons with chronic otorrhea are likely to become accustomed to their affliction and take the discharge more or less as a matter of course. Frequently they assert that the canal has been regularly and properly cleansed. On interrogation, however, and closer examination, it is evident that the cleansing of the canal must have been performed in a most desultory manner. Only a full realization of the serious consequences sometimes attending this complaint will arouse the patients to the importance of implicitly following the instructions given. Both physician and patient should remember that the successful outcome of treatment for chronic otorrhea depends largely upon the thorough, consistent and regular manner with which the patient removes the pus from the canal and constantly keeps it not only clean but dry.

A Plea for Early Operative Interference in Acute Suppurative Otitis Media. This is made by O. M. Rott.[3] He summarizes as follows:

Frequent bacteriologic examination of the secretions from an acute suppurative otitis media should be made.

Wherever the *Streptococcus mucosus capsulatus* has been identified as the infecting organism, operative interference should be instituted at once.

Every case of acute suppurative mastoiditis not responding to approved medicinal measures after a period of three weeks is a potential source of danger and should be subjected to operative interference.

The virulence of the infecting organism, the resistance of the patient and the anatomic configuration of the mastoid process are always variable factors, and as such preclude an absolute forecast of the outcome of any acute suppurative inflammation of the middle ear.

A skillful operation on the mastoid in acute disease is practically without danger to life.

It is the most rational way of dealing with a sup-

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(3) Northwest Med., February, 1920.

purative focus that does not respond to approved medicinal measures after a period of three weeks.

It obviates the possibility of there remaining a latent focus which sometimes obtains after a prolonged, apparently successful, non-operative case.

It more quickly permits resolution of the inflamed tissues surrounding the essential structures which govern the power of hearing.

Vaccine Therapy of Otitis Media. Autogenous vaccines in both acute and chronic otorrhea are used by H. L. Brehm,[4] who reports six cases:

Chronic otitis media, or a chronic running ear as it is commonly called, is dependent upon several factors. First, the exciting organism; second, the bodily resistance; third, the amount of tissue involvement; and last, but by no means least, the treatment of the condition when it was in its acute stage.

As to the first—the exciting organism, following diseases of childhood, the staphylococcus and the streptococcus are usual; following rhinitis coryza and grippe the *Bacillus pyocyaneus* and *Bacillus micrococcus catarrhalis* are more frequent; often there are unclassified diplococci, and in fact the diphtheria bacillis, the diphtheroid bacillus, and the pneumococcus and even the colon bacillus find an occasional habitat there. The tubercle bacillus is rarely demonstrable in the aural secretion, in spite of the fact that many tuberculous individuals have otorrhea. It is often a pleasant surprise to a patient to discover that an ear which has been discharging for months and which was supposed to be tuberculous and, therefore, incurable, is infected with nothing more formidable than the *Bacillus pyocyancus* or staphylococcus; and it is still more gratifying to have that ear clear up promptly under treatment.

The second factor is bodily resistance: The vast majority of these patients are dependent to a great extent on lowered vitality or resistance, due either to some organic trouble within the patient or to the so-called "sluggish infection," which is too weak to arouse sufficient resistance of the body to overcome it. Tuber-

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(4) Southwest Med., February, 1920.

culosis, syphilis and diabetes all have a tendency toward inducing chronicity.

Third, the amount of tissue involved: Briefly, if there is necrosis of one or more of the ossicles, or the mastoid antrum or cells are invaded, the disease is more intractable than if the membrane of the middle ear only is involved. Cases of this type are apt to develop sclerosis, eburnation, or polyp and granulation formation, which, of course, mechanically obstruct drainage and prolong the course of the disease. Eustachian infection, adenoids, hypertrophied tonsils and nasal deformities all act in the same way by reinfecting the tissues or by obstructing drainage. Neoplasms such as carcinoma or sarcoma in the middle ear are additional factors, but these fortunately are rare.

Finally, the treatment of the condition when it is in its acute stage, and it is here that the family physician is frequently responsible: Oils, pastes and powders are all used in an effort to alleviate the acute earache with the result that the ear canal is often filled with a sticky mass which not only obstructs drainage when rupture of the tympanic membrane occurs, but so obscures the condition that when the case is brought to an aurist it is impossible to estimate correctly the amount of damage. Hot antiseptic douches or even sterile water douches will accomplish all that is expected of the above remedies and the chances of a chronically running ear are immeasurably lessened. Of course, an early paracentesis is ideal, but these cases have a way of occurring in the middle of the night when the busy practitioner is too tired to respond and instead does a little telephone prescribing with the result that when he sees it the next day, Nature has displaced the knife and rupture has occurred.

Treatment of Chronic Otitis Media. The use of bismuth and iodoform in the treatment of chronic suppurative otitis media is advocated by F. Stoker.[5] He divides the cases into four classes:

1. Those in which the suppuration is not confined to the tympanum, but has extended to the mastoid or the labyrinth: Although in acute suppuration the whole

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(5) Lancet, Aug. 2, 1919.

middle-ear cleft is generally involved, this by no means holds good in the chronic stage. It is a common experience to observe the relief of mastoid pain and tenderness after tympanic drainage is established in acute cases, and it is equally common to open a healthy mastoid antrum when operating for the cure of chronic suppuration.

2. Cases in which nasopharyngeal or tubal sepsis is responsible for the continuance of the suppuration.
3. Those in which the bony tympanum is carious.
4. Those in which the suppuration is limited to the mucous tympanum.

It is only in cases belonging to the last group that cure may be hoped for by local conservative measures, but such cases are extremely common.

The treatment consists of:

Establishment and maintenance of thorough drainage. In the generality of cases this is already present, very many "chronic ears" presenting but a rim of membrane or even none at all.

Removal of crusts, dead epithelium, and all morbid material with hydrogen peroxide.

Thorough cleansing of meatus and tympanum.

Covering the tympanum with bismuth and iodoform powder. The powder is blown in with a fine-pointed, slightly curved, powder-blower through a large speculum.

The curative effects may be attributed to two causes:

1. The continual antiseptic action of the nascent iodine, which is being constantly formed from the iodoform.
2. The prevention of putrefaction in accumulated secretions by the same agency. The factor of putrefaction is an extremely important one in chronic suppuration.

Long duration of the condition is no bar to success. Many of the patients successfully treated have suffered seven and eight years. The presence of a polypus need not always cause dismay; it is not conclusive evidence of bone disease, but its removal is necessary before thorough treatment can commence.

Radical Treatment of Otitis Media. According to R. B. Canfield[6] the chief reason why practitioners have regarded chronic suppurative otitis media with indifference is that the majority of cases with which they have come in contact have resisted treatment either operative or otherwise. This is due to ignorance of the location and character of the pathologic changes within the mastoid and of those measures by which a cure can be effected. Physicians have become weary of irrigating and treating the middle ear through the canal without result and have been dismayed at seeing recurrence of the disease after thorough curettage of the mastoid. When one considers, however, that the attic of the middle ear is invariably involved and that this region is not reached by the ordinary mastoid operation and also that caries and cholesteatome formation invade the most minute Haversian system of the temporal bone, he sees two good reasons for the failures. Study of the spontaneous cures sometimes effected by Nature in even the most extensive cases has made clear the operative procedures by which success may be attained. We not infrequently see patients who in previous years have suffered from a chronic suppurative otitis, and whose ears have ceased to discharge. In a fair percentage of these cases the reason for the cessation of discharge is plain. Caries has destroyed the external wall of the attic and the inner end of the posterior wall of the auditory canal. This has thrown the external auditory canal, the tympanum and the mastoid into one irregular cavity, the walls of which have become lined with epidermis by extension inward of the skin of the external canal. This is Nature's radical operation and is the condition which the operator brings about by the radical mastoid operation; that is, a single cavity with smooth walls secured by throwing the tympanum, antrum, mastoid and canal together by removing the external attic wall, the posterior and superior canal walls and the entire mastoid process. By this method, the entire diseased bone is removed and a satisfactory approach to the brain, sinuses and labyrinth afforded should the necessity for attacking them arise. Although

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(6) Jour. Mich. State Med. Soc., October, 1919.

this method renders possible the exposure of all diseased areas, it can not be expected that it or any other procedure will permit the operator to eradicate the microscopic bits of carious bones and cholesteatome that have invaded the minute pneumatic spaces and Haversian canals that are met with in the deepest parts of the temporal bone. It is the cholesteatome that is the most difficult to eradicate. No matter how great pains have been taken nor how extensive the operation, the surgeon must recognize the possibility of infection in the depths of the wound during healing by the minute bits of cholesteatome forced out of the Haversian canals. To overcome this re-infection, it has been necessary to maintain the operative field open to observation and free of granulation tissue until epidermization of the mastoid cavity has become complete. By means of a plastic operation on the soft tissues of the posterior wall of the external auditory canal, the mastoid cavity can be kept under perfect observation until healthy skin can grow in from the edges of the canal, replace the cholesteatome and cover the cavity with steel gray epidermis. When this has taken place, the patient may be considered well. The final result then is a cavity hidden from view, composed of external auditory canal, tympanum and mastoid, covered with firm epidermis.

THE SINUSES.

Treatment of Lateral Sinus Injuries. Suggestions regarding the management of the lateral sinus after accidental injury during mastoid operations are made by Hunter Tod.[7]

The author includes only those cases in which the mastoid operation was performed for chronic suppurative disease of the middle-ear cleft and mastoid cells, and in which, at the time of the operation, the sinus was apparently healthy. Septic infection of the sinus after injury rarely took place. These injuries were divisible into two groups:

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(7) Lancet, March 1, 1920.

1. A clean cut through the wall of the sinus, with profuse hemorrhage, requiring obliteration of the lumen of the sinus. In these cases he has never observed subsequent infection of the sinus.

2. Grazing of the outer layer or puncturing of the sinus wall with no bleeding or with only slight oozing of blood for a moment or two, the injury being so slight as to escape notice unless a careful examination be made at the time of the operation.

He gives details of six cases, four in his own practice, with one death. In the fatal case all seemed to be going well until the eighth day, when the patient had a rigor and the temperature rose to 103° F. Tod operated again on the ninth day, performing ligation of the internal jugular vein. Perforation of the sinus wall was discovered and a septic clot was removed. The autopsy showed a septic thrombus and pus in the circular and both cavernous sinuses, extending into both ophthalmic veins.

Tod's conclusions are as follows:

Whenever the lateral sinus is exposed during the mastoid operation, careful examination should be made to see if it has been injured, even slightly. If so, it should be exposed freely on each side and its lumen obliterated by packing with gauze well beyond the affected area. There may be no evidence of infection of the sinus until the ninth day or later; a sudden rigor may be the first symptom. This, with an increased pulse-rate should be regarded as a danger signal. If hemorrhage occurs from the mastoid wound a few days after operation, it is not sufficient to arrest the hemorrhage by applying pressure to the bleeding spot; the bone should be removed from the sinus wall above and below the affected area, and a gauze plug inserted between the bone and the outer wall of the sinus. Hemorrhage associated with pyrexia or a rigor always means septic infection, and in the latter case the internal jugular should always be ligated.

The Possibility of Proving Renewed Permeability of a Formerly Thrombosed Lateral Sinus in the Living. The usual postmortem finding in case of a formerly thrombosed lateral is an obliterated sinus. O. Mock,[8] however, believes that in some cases the vein becomes again permeable to the blood stream and attempts to adduce evidence from his examinations in the living. He has shown in a former article that in certain individuals it is possible to produce a venous hum through compression of the subclavian vein of the opposite side. By this means a swifter flow of blood is induced out of the cranial cavity which causes the hum to be audible on auscultating the opposite jugular vein.

He cites one case of sinus thrombosis which was tested before operation and showed a venous hum on the healthy side but none on the affected side. After the operation of opening the sinus and removing the clot, the patient was given the usual after care. During the first six weeks the veins were auscultated every eight days. In the seventh week, there appeared over the jugular bulb on the affected side a fine continuous singing sound which was very plain when the patient held his breath momentarily. It was more marked when the patient turned the head to the opposite side and especially prominent when the opposite subclavian vein was compressed (without compressing the carotid artery). For the following twelve weeks this phenomenon was always to be found. Inasmuch as during the time the sinus was thrombosed and for six weeks after operation no such sound could be detected, only to appear later, the author concludes that the vein must again have become permeable. Also he shows that during compression of the opposite subclavian the patient showed no signs which would be due to venous stasis within the cranial cavity.

In a second case, the sinus wall was partly excised and the clot left *in situ* with only a light packing overlying it. For ten months following no venous hum could be detected either on turning the head or compressing the vein on the opposite side. The latter procedure caused cyanosis, vertigo and scotoma, thus showing that the vein on the affected side was still occluded.

In a third case of sinus thrombosis, the patient, when

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(8) Zeitschr. f. Ohrenhlk., Vol. 74, No. 1.

examined three years after operation, presented the following condition:

With head erect a perceptible venous hum was heard over the clavicle and near the bulb on the affected side. This was increased by turning the head to the opposite side and by compression of the opposite subclavian vein. The author was able to rule out the external jugular as the source of this hum through compression of its tributary veins by a compression bandage about the head, as well as by pressure on the facial vein. Also no symptoms of intracranial venous stasis ensued during this test.

Osteitis of Sigmoid Sulcus Simulating Phlebitis of Lateral Sinus. G. Mahu[9] cites the case of a woman, aged 59, with acute mastoiditis, in whom immediately after operation, he closed the retro-auricular wound leaving a bundle of silkworm-gut for drainage at the lower angle of the wound. There was a serious relapse, with pain, phlegmon of cervical region, fever, chills and a metastatic abscess in the wrist-joint, which led to fear there was thrombophlebitis of the lateral sinus. A delicate operation was necessary as the osteitis of the sigmoid sulcus extended almost to the jugular gulf.

Complete cure, verified by bacteriologic examination of the smears, was obtained in two weeks, by means of secondary suture on two occasions. However, instead of obtaining this sterilization by Carrel's method as Mahu had done previously, it was accomplished by tamponnade with 10 per cent. iodoform gauze, thus as in many other instances simplifying the technique, while still retaining the essential principles of the method.

Septic Sinus Thrombosis Without Involvement of the Mastoid. This case is reported by J. R. de Caradeuc.[1]

Private S. B., aged 23, was admitted to hospital Jan. 14, 1919, with influenza. January 18, he developed measles; January 30, otitis media purulenta acuta of the right ear; January 31, otitis media purulenta acuta of the left ear. Myringotomy was done in each case

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(9) XXXI Congrès Français d'Oto-Rhino-Laryngol., 1919.
(1) Jour. Amer. Med. Ass'n., May 3, 1919.

the day of the development of the acute ear trouble, and irrigations of boric-acid solution every two hours were ordered.

The course of the patient's illness was such as would be expected with this complication of diseases and the temperature ranged irregularly from 98° to 104° F.

February 14, the patient was transferred to the ear ward, as the influenza and measles had subsided and there was no clinical evidence of any disease aside from the discharge from the ears.

February 18, both ears were dry, and on examination the drums presented the appearance of resolution.

February 20, the patient complained of discomfort over the left side of the face, and kept the head covered the entire day. There was no headache. The blood count was: 15,000 leukocytes; 79 per cent. polymorphonuclears.

February 23, the patient had a definite chill lasting about twenty minutes, followed by a rise of temperature to 105.2° F. (by mouth), accompanied by severe frontal headache, and followed by a profuse sweat. The blood count was: 23,300 leukocyltes; 93 per cent. polymorphonuclears. The blood culture was positive *Streptococcus hemolyticus.*

February 24, the patient complained of headache, general in character and not confined to any special point or region.

At noon he had a severe chill lasting thirty minutes, followed by a temperature of 104.6° F. Examination of the ears at this time showed the right drum to be normal in appearance with good inclination and light reflex normal. The left drum showed much the same appearance except for absence of the light reflex and a slight dulness. This was the second ear to become involved and this difference in appearance might perhaps be accounted for in this way. Both drums presented the appearance of a revolving acute otitis media. There was absolutely no mastoid tenderness at this time or at any time during the course of the illness. The blood count was: 38,000 leukocytes; 94 per cent. polymorphonuclears. The blood culture was negative. The physical examination and the urinary examinations were also negative. The fundi were negative. No lumbar puncture was done.

Operation was decided on, but in view of the urinary findings it was suggested that there might be some kidney condition to account for the septic course the patient was running. A cystoscopic examination was made by the urologist, and the findings were negative.

February 25, the blood count was: 31,200 leukocytes; 94 per cent. polymorphonuclears. The blood culture was negative.

A simple mastoidectomy under ether was performed with the following findings: The cortex was thick and very sclerotic. The mastoid cells were normal, and there was no pus even in the antrum. The sinus was exposed, but it was decided to uncover and inspect the dura over the temporosphenoidal lobe and cerebellum. This was accomplished after considerable difficulty on account of the ivory-like hardness of the bone and the high middle fossa. Much time was consumed in this way unnecessarily. After exposure of the dura and finding it normal, a further examination of the sinus was made, and as it appeared paler than normal, it was opened and thick pus exuded and continued to exude as from an abscess. The jugular vein was then resected, after which the sinus was again attacked from the mastoid wound. The diseased walls were cut away, and only the dural wall was allowed to remain. A culture from the sinus showed a pure growth of *Streptococcus hemolyticus*. The vein was normal.

The patient made an uneventful recovery.

This case was unusual in that the infection must have spread from the middle ear without involving the mastoid and in that there was a negative appearance of the drum with absolute cessation of the discharge and negative findings in the mastoid. It has been the author's experience to find great destruction of the mastoid cells when *Streptococcus hemolyticus* is the causative factor, with pain and tenderness over the mastoid negative.

Perisinus and Epidural Mastoid Abscess Subsequent to Influenza. These cases are reported by H. B. Blackwell.(2)

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(2) Med. Record, May 17, 1919.

All these patients were young adults, and each exhibited evidences of a post-aural subperiosteal inflammation. In addition the operation disclosed in each patient the presence of a large perisinus or epidural mastoid abscess.

It is surprising to note the comparatively small number of serious cases of mastoid suppuration that have heretofore complicated influenza, when we consider the wide prevalence of the epidemic, its virulent character, and the proximate relation between the chief site of infection and the mastoid cells.

In two cases the latent manner of their development suggests the possibility of the presense of an unsuspected perisinus or epidural mastoid abscess in other post-influenzal patients with aural disease.

The importance of otologic examination is clearly indicated by the histories of these patients, not only when an earache is present, but in all cases of subjective aural disturbances following influenza.

Finally, Blackwell emphasizes the importance, when operating upon these patients, of leaving undisturbed protective granulations overlying the sinus or brain. All microscopic evidences of diseased bony mastoid structure should be removed. In addition to the usual technique of the simple mastoid operation, he believes in gentle curettement of the epitympanum without, of course, disturbing or dislocating the ossicular chain. He has practiced this procedure for a number of years, when performing the simple mastoid operation, with very satisfactory results.

Interpretation of Symptoms in Mastoiditis. Considerable difference of opinion may arise among otologists in the interpretation of the various symptoms encountered in acute mastoiditis, but, according to R. J. Tivnen,[3] practically all are agreed on the following propositions:

The majority of acute mastoiditis cases are chargeable to an extension of a suppurative otitis media to the mastoid cells.

The majority of suppurative middle-ear infections

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(3) Illinois Med. Jour., February, 1920.

are caused by disease processes in the nose, throat, and nasopharynx.

A moderate amount of mastoid tenderness and a varying degree of mastoid involvement is present in the majority of cases of acute middle-ear suppurations, but this mastoid infection and tenderness, if early and adequate drainage be provided may, unless other determining symptoms develop, be accepted without alarm for two to three days, and does not, during this period of observation, demand a mastoid operation.

In addition to the virulence of the infection and resistance of the patient, the particular "build" or architecture of the individual mastoid process is an important element in estimating the diagnosis and interpreting the clinical development.

The mastoid of infancy and early childhood is anatomically essentially different from that of the adult; and these anatomic variations are of determining influence in inaugurating and extending such infections, and must be reckoned with in interpreting their particular symptomatology.

Tivnen gives the following analysis of symptoms:

1. Pain: This symptom is influenced by the temperament of the patient; a child or a neurotic will exaggerate it, while a phlegmatic individual will underestimate it. It is almost always, in a greater or less degree, a constant accompaniment of mastoid infection, though cases are seen in which it is absent. It may not be confined to the process itself, but radiates upward over the temporal, backward over the occipital regions and downward toward the teeth. The patient often describes it as a "sickening," "exhausting" pain or "soreness," deep, boring in character, usually worse at night, causing sleeplessness and insomnia. When the discharge is abundant the pain is usually less; when it diminishes or ceases, the pain is increased. If it is not relieved by proper drainage or other measures, or returns after being absent for several days, it is an indication that the process is advancing and that operation is advisable.

2. Tenderness on pressure: According to their relative significance and frequency Whiting enumerates four tender points: first, antrum; second, tip; third,

the point of emergence of the emissary vein; fourth, the pre-mastoid lamina, or posterior wall of bony meatus.

In estimating the tenderness over a suspected mastoid, the healthy mastoid should always be the basis for comparison.

The period of onset of the tenderness and its behavior is important. With the subsidence of the pain and discharge, it should grow less, should it increase it indicates an advance of the process. If it is absent at the beginning of a middle-ear suppuration and appears later, it usually indicates mastoid involvement. It commonly reaches its maximum during the early vascular stage, and is more marked in mastoids of the pneumatic type with thin cortex, than in those of sclerotic type with thick cortex.

3. Discharge from the external meatus: The majority of acute mastoiditis cases have an associated discharge from the external meatus. Deficient drainage from the middle ear usually produces an exaggeration of the mastoid symptoms. Diminution of the discharge should be associated with the reduction of pain and tenderness in and over the mastoid and perceptible improvement in the patient's general condition in order to justify the conclusion that the disease is progressing favorably. If the free drainage, in considerable amount, abruptly ceases, returning a few hours or a day or so later, the patient's other symptoms meanwhile exhibiting no improvement, a mastoid involvement is to be apprehended. A profuse discharge from the external meatus continuing for more than one week, particularly if associated with the continuance of the mastoid and other general symptoms, and more especially if the local and general symptoms increase in severity, points with almost unvarying certainty to acute mastoiditis.

4. Temperature: Some difference of opinion exists as to the value of this symptom. Bacon states: "I have never seen a case of acute inflammation of the mastoid cells without slight elevation of temperature, except in one instance." Numerous cases of extensive necrosis of the mastoid cells are reported in which the temperature has run a normal course, and its absence, therefore, is

not to be interpreted as an indication that extensive mastoid involvement is not present.

5. Changes in the tissues over the mastoid: Edema, redness and prominence of the auricle are relatively late manifestations of acute mastoiditis. Edema is more often characteristic of a furuncle of the external canal than of mastoiditis. The pus may perforate the cortex producing a sub-periosteal abscess, which occurs quite frequently in infancy and early childhood. The perforation of the cortex is usually located from 0.25 cm. to 1 cm. behind the posterior canal wall. In such cases the region is swollen and red, the auricle projects from the head almost at right angles, the fold where the concha is attached is absent, and a mass in which fluctuation may be demonstrated is presented. Not uncommonly the periosteum and overlying mastoid tissues become involved without perforation, by extension of the mastoid inflammation through the cortex, causing edema and swelling which are not so pronounced, and do not cause such conspicuous auricular displacement as that produced by a sub-periosteal abscess. In the type designated, ''Bezold's mastoiditis,'' the pus has penetrated the mastoid tip at the digastric fossa. In this form the swelling is situated just below the tip and the soft tissues of the neck may be infiltrated.

6. Sagging of the postero-superior meatal wall: The majority of observers agree that this is one of the decisive symptoms of the presence of an acute mastoiditis, many considering it a pathognomonic symptom, demanding immediate mastoid operation. The explanation of the symptom is the anatomic fact that the upper wall of the external meatus close to the drum membrane constitutes the floor of the aditus ad antrum and that pneumatic spaces are usually richly distributed along the anterior face of the process which constitutes the posterior wall of the canal. When the cells of this locality are distended by an inflammatory exudate or pus, sagging of this portion of the canal takes place. Associated with this symptom the fundus of the canal is much reduced in size and only a portion of the drum is visible. The lumen of the canal at other points is normal.

7. Changes in the drum membrane: The drum is usually perforated at some point or is red, swollen and bulging. Pronounced bulging of the upper and posterior portion of the drum is frequently associated with the sagging of the external canal and is due to the same cause. If the perforation is in Shrapnell's membrane, it is indicative of an acute exacerbation of a chronic otorrhea.

8. Pulsating light reflex: Politzer states that if a pulsating light reflex at the point of perforation in the drum membrane continues to be seen two weeks from the date of the rupture and the ear is still discharging, a mastoid abscess is present.

9. Blood examination: Estimates of the degree of leukocytosis and the polynuclear percentage present in a given case are held, by most observers, to be of doubtful value as an aid to diagnosis. It is probable that a differential blood count which exhibits both a marked leukocytosis and a high polynuclear percentage is of value in suggesting a mastoid involvement, taken in connection with other confirmatory symptoms and signs.

10. Bacteriologic examination of the aural discharge: This occupies the same position of doubtful value as a diagnostic measure as the differential blood count. The usual microörganisms found are the streptococcus, the pneumococcus, the staphylococcus, Friedlander's bacillus, and mixed infections.

11. Roentgenograms of the mastoid as an aid to diagnosis are, when properly taken and correctly interpreted, of value. Several plates taken at different periods may show the progress of the mastoid disease, indicated by cloudiness of the process, destruction of the septa and the presence of cavities. Taken in connection with other clinical findings they are of undoubted value and their use should be adopted as a routine measure.

Autoplasty of Retromastoid Cicatricial Orifices. The plan proposed by P. Lauens,[4] he states, can be applied to gaps no matter how large. The orifice is circumscribed by an incision, two triangular flaps are mapped out, superior and inferior, which are turned to cover the

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(4) XXXI Congrès Français d'Oto-Rhino-Laryngol., 1919.

opening, the anterior and posterior lips of the incision are brought together by sliding above these flaps.

Hemorrhage After Mastoidectomy. A case of severe and uncontrollable hemorrhage following mastoidectomy in a patient with purpura is reported by T. J. Harris.[5]

In differentiating between purpura and hemophilia it may be said that hemophilia is an hereditary disease characterized by a deficiency in one or more of the clotting properties of the blood which results in prolonged coagulation time. Purpura, on the other hand, representing many different conditions, is characterized by a deficiency of the blood platelets. Hemophilia, as is well known, is likely to occur in males, although it is transmitted through the female. Purpura occurs both in male and female. The bleeding in hemophilia is really unduly prolonged normal bleeding and occurs usually after injury. The bleeding in purpura is likely to occur spontaneously. As shown by Duke, bleeding time following the puncturing of the skin is increased in purpura. It is not increased in hemophilia. Purpura is characterized by frequent subcutaneous hemorrhages. A definite deficiency in the amount of prothrombin has been shown by Howell to be demonstrable in hemophilia; in purpura, on the other hand, it is normal.

It would seem that with these characteristic differences the differential diagnosis between the two disorders would not be difficult. In the majority of cases it is not. There is, however, a certain number of borderline cases in which the diagnosis is exceedingly difficult. These present features of both diseases. In them the bleeding may occur both in male and female members of the same family. Clinically, these cases closely resemble one another. It would seem to point to the fact that there is an intimate association between them in the blood pathology, which up to the present time has not been determined. To quote Hess:

"The striking hereditary character of true hemophilia has frequently led to the assumption that the mere fact that the bleeding tendency was hereditary constituted strong evidence for the hemophiliac and against the purpuric nature of the disorder. This has been our experi-

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(5) New York Med. Jour., Aug. 23, 1919.

ence in regard to cases referred to us by physicians and is the point of view which pervades the literature of hemorrhagic disease. The matter, however, is not so clear cut. The fact is that, although purpura may not be hereditary and may be idiopathic or due to sepsis or many other causes, there is a definite hereditary purpura.''

The case reported falls in this class. The family history of two brothers dying of hemorrhage as well as of the mother suffering from frequent attacks of hemorrhage and the history of frequent subcutaneous hemorrhages are in line with this. More important still is the fact that the clotting time was never above fifteen minutes and shortly before the operation was as low as four minutes. Further confirmation is the number of blood platelets, which, while not greatly diminished, was below normal. It is a source of regret that the unexpected death of the patient prevented a more extended study of the blood. From a clinical viewpoint, the case was of more than usual interest. Some years ago the author reported a case of purpura in which the life of the patient was apparently saved by the injection of normal blood serum. In the case under discussion there were given altogether 1,400 c.c. of human blood by transfusion. This undoubtedly had the effect of saving the patient's life. It did not, however, appear to have any effect upon checking the bleeding. The interesting question presents itself in this connection, whether the use of the citrate solution had the tendency to prevent clotting. Opinions differ on this point. On account of this possible effect the last transfusion was given by the direct instead of the indirect method but without any appreciable difference in the result.

It will be further noted that the hemorrhage during the operation was in no way excessive. Tight packing failed to control the bleeding, which came from no one part of the wound but from its entire extent, superficially and deep. More efficacious than anything else was the suturing of the wound. This had the effect of completely stopping the bleeding for a time. It was followed by edema of the eyelid, but strangely enough there was no escape of blood into the throat through the Eustachian tube. Coagulen gave no benefit. Hemoplastin, on the other hand, appeared to be of decided benefit. This is in keeping with the results obtained by Hess in several of the cases which he reported. Composed as it is of normal tissue juices, the benefit secured would point to the deficiency of these in Harris' patient. Giving whatever credit is due to the employment of this, it seemed to him that there was a gradual recovery of the power of coagulation as the case progressed and that to this chiefly is to be ascribed the ultimate recovery. A gratifying and unexpected feature of the case was the absence of all evidences of septic absorption from the abscess in the neck in spite of the enforced imperfect drainage, which took place on account of the necessity of keeping the mastoid wound tightly packed. The final fatal termination of the case, according to the experience of those who have followed the course of similar cases, was not unusual.

Posterior Mastoiditis With Suboccipital Purulent Focus and Nervous Syndrome. After experience in three cases, M. Fiocre[6] emphasizes the markedly latent and insidious nature of the ''posterior mastoiditis'' of Moure. He also directs attention to the rather special symptoms: The pain and swelling are behind the mastoid on the side of the neck; movement of the head is painful and the patient exhibits a true torticollis. Lastly, the presence of a deep collection of pus in the vicinity of the foramen lacerum posterius and the occipital condyle accounts for the possible appearance of a nervous syndrome, termed by Sicard and Vernet—the neurologists—syndrome of the posterior lacerated area.

Details of the two cases are given corroborating this possibility: In the first there was lingual hemiparesis due to involvement of the hypoglossal nerve. In the other patient there was velopalatine hemiparesis, associated with paralysis of the superior constrictor of the pharynx from a lesion of the inner branch of the spinal accessory nerve, and the glossopharyngeal. In both instances the paralysis was only temporary, and no doubt due to compression of the nerves. A systematic search

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(6) Jour. de méd. de Bordeaux, Aug. 10, 1919.

for this syndrome may lend considerable aid to localization of the lesion, and be a guide for the knife.

Atypical Mastoiditis. S. MacCuen Smith[7] finds atypical mastoiditis a subject of almost tragic importance. He states that in recent years a vast majority of all cases of mastoiditis are atypical in type, which would emphasize the advantage of expert counsel to assist in diagnosis.

It is well to remember that the mere presence of an influenza epidemic does not necessarily mean that the aural complications will be very extensive. This was especially noticeable in the epidemic of last year, not only in this country but in practically all of Europe. If that epidemic had any particular characteristic in relation to otology, it was the relatively few aural complications, especially those of a serious nature, incident thereto. No doubt this immunity is due somewhat to the character of the microbic invasion, but is probably influenced more by the virulence of the infection in the nasopharynx, as well as the transmission of microorganisms through the blood stream or lymphatics to the organ of hearing. In a series of microscopic examinations made from the secretions of the nose and throat and aural discharges, it was definitely shown that the bacterial invasion did not differ materially in this last epidemic from that of former occasions, except that the pneumococcus and the various strains of the streptococcus were more numerous. In Smith's experience, the *Streptococcus hemolyticus* was responsible for a majority of aural diseases in which complications later developed. In previous epidemics an examination frequently revealed the presence of the pneumococcus in pure culture in pus taken from the mastoid.

He has so frequently found the *Streptococcus pyogenes* or the *Staphylococcus aureus* in otitic suppuration in which brain abscess meningitis or sinus thrombosis subsequently developed, that he has learned to regard their presence with cautious expectancy. Under such circumstances, he would advise against undue delay in operative intervention, as suppuration showing these

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(7) Southern Med. Jour., March, 1920.

organisms, as well as the pneumococcus, generally arises from a deep-seated inflammatory source.

Another fact of clinical importance is the well-recognized, insidious action of the *Streptococcus mucosus capsulatus.* The incipient stage may be as severe as other forms of infection, but under proper care the symptoms, except the discharge, may promptly subside. Should this otorrhea continue for several weeks, extensive carious erosion invariably occurs, and we are often surprised to find an exposed dura or sinus, without symptoms that should be expected in such a condition. In such cases, operation should not be delayed. The blood picture is of little or no significance unless further complications supervene.

The importance of mastoiditis will be better appreciated when the profession recognizes the fact that the mucosa lining the mastoid antrum and cells is involved in every case of tympanic suppuration, perhaps to the same degree as that present in the middle-ear cavity. If the drainage be ample, as provided by a large aditus, the inflammatory process gradually subsides, but when the anatomic structures are small, insufficient drainage results, and this, in turn, favors retention of pus, with consequent mastoid abscess development, even though this process may be tardy and the original tympanic suppuration already subsided.

The atypical type of mastoiditis occurs when the mastoid is small and the cortex comparatively thick and dense. In such cases the course of erosion will naturally follow the path of least resistance and invade the sinus or the interior of the skull. Such cases develop a brain abscess and meningitis, or even a slowly developing sinus thrombosis, with an absence of symptoms that is most misleading and even puzzling. On several occasions, a temporosphenoidal abscess gave absolutely no symptoms and was discovered only during the mastoid operation.

If an ear discharges profusely for two or three weeks, the mastoid cavity undoubtedly has been invaded simultaneously with the tympanic cavity, as it is scarcely reasonable to feel that a discharge of such quantity could be secreted in the small middle-ear cavity. After the acute symptoms have subsided the patient will frequently go about his business, while presenting no symptoms whatever except a discharging ear. A condition of this type requires drainage through a mastoid operation, regardless of the absence of any and all symptoms. Neglect in such instances is the forerunner of a chronic otorrhea, with its attendant impairment of hearing and various complications. So long as there is no obstruction to free drainage, let the discharge be profuse or even scanty, we can not depend on general symptoms, such as chills, sweating, elevation of temperature, hyperleukocytosis or an increase in the polymorphonuclear percentage for gauging the severity of the disease, since the above symptoms are often very late and usually are signs of the extension of the pathologic process through erosion of the bony structures.

Roentgen-ray photographs of the organ of hearing have been of inestimable value in a diagnostic way in some of these atypical cases which would have been otherwise most puzzling. The lack of confidence expressed by some as to the value of roentgenography in this line of work is probably due to the fact that expert interpretation is not always available. The technique or art of roentgenography is perhaps not very difficult to acquire, but the interpretation of the plate is, like any other diagnostic study, dependent for its value upon the experience and ability of the man who makes it. Accurate knowledge of anatomy and pathology and of the tone values in *x*-ray plates must be combined to make the opinion of real worth.

Mastoid Abscess Without Involvement of the Middle Ear. This case is reported by L. N. West.[8]

The patient, a girl of 14, had a swelling behind the right ear. This was painted with iodine, but with no improvement. Examination showed a hard, non-fluctuating mass behind the ear, about 1½ inches in diameter. The auricle was pushed forward and seemed to stand away from the head. The membrane tympani and external auditory canal were entirely normal; the hearing was normal; and the white blood count was 14,000. The *x*-ray showed some bone destruction.

Operation was advised and performed the same day.

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(8) Southern Med. Jour., June, 1919.

On making the incision, pus was encountered and on exposing the bone a small opening was found leading into the antrum. The entire mastoid was broken down, leaving exposed both the dura and lateral sinus. The middle ear was well walled off by granulations which were not disturbed. The drum was not opened and at no time did the patient have any discharge from the ear. The wound closed in the usual manner and the patient was entirely comfortable until the third day, when her temperature suddenly rose to 103.5° F., with a chill. Another white blood count was made and found to be 12,000. Temperature was normal within two hours. The following day the temperature was 101° F. A malaria stain was made and found negative. Next day the temperature again rose to 103° F. There was another chill and the blood smear showed malaria. Antimalaria treatment was started and the temperature never again rose above normal. Examination of pus from the wound showed staphylococcus. Four weeks after operation the mastoid wound was entirely healed.

[In such cases, the probabilities are in favor of the infection having reached the mastoid through the Eustachian tube, and middle ear, even though there may have been no marked symptoms of middle-ear disease.—Ed.]

Tuberculous Osteitis of the Temporal and the Adjacent Ear Cavities. Some five clinical types are recognized by Bellin, Aloin and Vernet,[9] to wit: (*a*) The type with progressive infiltration, or latent tuberculous mastoiditis; (*b*) the type followed by necrosis with sequestra formation; (*c*) the rarefying-ulcerative type with perforation; (*d*) chronic osteitis of the tympanum with accompanying hypertrophy of mastoid; lastly, (*e*) osteitis of the external auditory meatus or of the temporal bone itself.

Each type is illustrated by a typical history. All of the series were more or less characterized by manifestations which led to diagnosis of tuberculosis, in fact four of the patients succumbed to tuberculous cachexia: The remaining one exhibits typical symptoms of tuberculous osteitis, *i. e.,* local tuberculosis.

Evidently no one method of treatment will do for

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(9) Jour. de chirur., 1919, p. 486.

these diverse forms. Unless the foci can be thoroughly evacuated, local measures tend merely to render the condition worse. While the complications may be such that intervention is indicated, generally speaking the authors advise that measures be adopted looking toward improvement of the general health, and that no local treatment be resorted to.

Paresis of the Oral Branch of the Facial Nerve After Mastoid Operations. A cross section of the facial nerve in its descending portion within the facial canal shows the fibers forming the oral branch to be the most posterior. E. Ruttin[1] cites two cases in which the mastoid cells encroached on the canal posteriorly and internally near the stylomastoid foramen causing a paresis affecting only the muscles supplied by the oral branch. He points out that cells in this location should be curetted with the greatest care because of the danger of injuring the nerve. These cases are unusual as the majority of pareses of mastoid origin affect the ocular branch through injury to the nerve in its tympanic portion or in the facial ridge.

Incomplete Mastoid Operation. Incomplete mastoid operation is frequently the cause of delayed healing, according to F. T. Hill.[2]

With diagnosis for the most part easily established and operation devoid of its terrors, it would seem that the too often extended period of convalescence and the too frequent failures necessitating secondary operation are fields for criticism. Far too often, compared to other fields of surgery, does the postoperative period drag out ten, twelve, or more weeks, and then further operative interference is required to insure healing and a dry middle ear.

A case that drags along unduly after operation must be considered in the category of failures, since we are confronted with what is really a case of chronic osteomyelitis, with its liability of complications, something we hope to avoid after thorough surgery. We endeavor to preserve the hearing by means of the simple mastoid operation, but with a long continuation of the suppura-

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(1) Zeitschr. f. Ohrenhlk., Vol. 73, No. 3.
(2) Jour. Maine Med. Ass'n., March, 1920.

tive process in the middle ear there is bound to be a loss in this respect.

Under the heading of failures, Hill groups cases, both excusable and inexcusable, resulting in (1) death; (2) complications, whether requiring operation or not; and (3) extended postoperative period, whether requiring further operation or not.

The first two subdivisions may be really considered together, for it is indeed safe to say that a patient does not die of mastoiditis *per se*. The lethal blow is dealt by some complication, such as sinus thrombosis and resulting general sepsis, cerebral or cerebellar involvement, or some metastatic process; meningitis, or brain abscess.

The condition of the middle ear and mastoid at the time of operation must be considered. In this discussion Hill disregards cases in which operation was obviously too long deferred, or those in which there was a chronic suppurative otitis media and similar extenuating circumstances. Given an acute mastoiditis in an otherwise healthy individual, operated on in what was considered due time, why should there be any unduly extended period of healing? Three facts enter into the answer to this question: (1) The resistance of the individual; (2) the virulence of the infection; (3) the character of the operation.

As we are chiefly concerned with the otherwise healthy individual the first factor need not be considered to any marked extent. The fact that syphilis, tuberculosis and other general diseases retard healing is far too often an easy and plausible excuse used to palliate one's conscience in the case of delayed healing. Debilitation of the patient from long-continued illness may play a most important part in convalescence. Uncinariasis may be a factor. The condition of the nasopharynx, the presence of adenoids, diseased tonsils, deviated septa and accessory sinus infections and their well-known relation to the delayed resolution of the middle ear must indeed be considered, but if in the otherwise healthy patient we try to place the blame for non-healing on the patient's poor resistance, in the majority of cases we will be sadly in error.

The virulence and type of the infection play a somewhat larger rôle, though here again we must take care not to find ourselves hunting for an excuse for our own surgical shortcomings. We encounter a series of acute mastoids within a certain period of time, and, so far as laboratory findings can indicate, of a similar infecting organism. These same cases will vary markedly in their postoperative response in a way unexplained by the nature or virulence of the infection.

By far the leading factor seems to be the character of the operation. It is unnecessary to consider the incomplete so-called mastoid operation of the untrained operator. We are concerned with the modern simple mastoid operation, the more or less thorough extenteration of the mastoid process.

The pneumatic mastoid following operation seems generally to rejoice in a shorter and more uneventful period of convalescence than in the other types. Secondary operation is much less frequently required. The cases tardy in healing and those reverting to the operating table are more often found among the diploetic and diplopneumatic types.

It is fair to presume a greater degree of success for the primary mastoidectomy in the pneumatic type, for the average aural surgeon will not consider his operation complete until he has followed out every cell and pretty thoroughly exenterated the mastoid, removing all possible foci for recurrence or continued suppuration. In some cases with cells extending forward into the root of the zygoma and over the external auditory meatus even to the tempero-mandibular articulation, or upward and backward into the occipital, there may be considerable difficulty, but with the help of the radiograph a thorough exenteration is usually accomplished.

In the diploetic and diplo-pneumatic types we have a different condition to deal with. The operator, upon reaching what he feels is solid sound bone, is apt to consider discretion the better part of valor and stop before completely exenterating the mastoid. In the majority of cases he wins out and the mastoid heals in a varying period of time, but from our observations, in about 12 per cent. of the cases re-operation is necessary. The diploe may contain quite as much potential trouble as the cells of the pneumatic type. Unless the mastoid is completely cleaned out to its boundaries, we may have a condition simulating a chronic osteomyelitis, resulting in at least an extended period of healing and possibly requiring further operative procedure.

Let us consider the mastoid as a collection of cellular or diploetic, or dense bone; a matrix, surrounded by the cortex corresponding to the outer table of the skull and on the internal aspect by the plates of the inner table. It is posterior to the hard bony external meatus wall and anterior to the plate covering the lateral sinus. Above is the plate forming the floor of the middle fossa. The cortex of the mastoid surrounds this at the tip and encroaches inward and upward, forming the prominence of the groove for the insertion of the posterior belly of the digastric muscle. This cellular or diploetic matrix sometimes extends into the substance of the petrous portion and even to the sphenoid.

As the lateral sinus bends forward and downward, forming the so-called knee, it makes an angle with the floor of the middle fossa above. Sometimes this angle is very acute and the space within is very narrow, with consequent temptation on the part of the operator to overlook this, especially if solid. Doing so may be a cause of continued suppuration and necessitate a secondary operation later. Frequently as the sinus swings downward, inward and slightly backward below the knee before making its exit through the posterior lacerated foramen, there is another angle or space formed between its plate and the prominence of the digastric groove. This is frequently overlooked in operating, the surgeon making a beautiful excavation to the tip from the plate covering the sinus but neglecting to dissect out this important angle. This is a favorable site for a perisinus abscess.

Too many mastoid operations may be likened to sweeping a room without touching the corners. These corners or boundaries of the mastoid should be thoroughly cleaned out to insure healing. Whether pneumatic or diploetic or a combination of the two, the zygoma, the cells or diploe just posterior to the external auditory meatus, the tip, and the angles between the sinus and the floor of the middle fossa and the sinus and the digastric groove should be as thoroughly exenterated as possible. Leaving these points should no more be thought of then neglecting to open the antrum.

The author presents the following summary:

The period of convalescence is mainly dependent on the character of the operation. This is generally the cause for delayed or non-healing mastoids. Early healing and uneventful convalescence depends upon thorough exenteration.

Cases of delayed healing and those requiring secondary operation are met with more frequently in the diploetic and diplo-pneumatic types, where there is a persistence of the diploe or "dense mastoid mass."

The cause of this is neglect upon the part of the operator of certain areas, this oversight being less likely to occur in the cellular mastoid.

The "favorite points" overlooked are: the angle between the sinus and the floor of the middle fossa; the space between the sinus and the prominence of the digastric groove; and, less frequently, the zygoma, posterior meatus wall and the tip.

Treatment of Mastoid by Chlorinated Soda. Postoperative treatment of the mastoid by the use of surgical solution of chlorinated soda is described by J. B. Potts.[3]

The author believes that the method is characterized by the following results: (1) The maximum safety for the patient; (2) the minimum time of convalescence; (3) the minimum deformity.

In order that any method of closing the mastoid wound may be uniformly successful, a thorough mastoidectomy must be done. Considering now that this operation has been done, a Carrel-Dakin tube is placed in the excavated mastoid cavity, starting at the tip of the mastoid and having its exit at the upper angle of the wound. A second tube is adjusted so that it lies in the opening of the antrum and has its exit in the lower angle of the wound. These tubes are brought forward and upward and fastened with a strip of adhesive plaster to a point on the temporal region of the forehead. The wound is closed with the usual catgut sutures, care being taken to carry them through all the layers of tissue. It is well not to place the stitches closer than three-sixteenths inch to each angle of the wound in order that a little space may be left for drainage around each tube. This precaution adds greatly to the comfort of the patient at the time of irrigation. A small sponge is placed directly over the mastoid cavity and pressed down firmly so as to obliterate as much dead space as possible. A cotton pack about 8 inches square enclosed in gauze is placed over the ear, and the head is bandaged in the usual way. It is very essential for the comfort of the patient that the cotton pack be sufficiently thick to absorb all the moisture from the irrigations. In applying the bandage, from ½ inch to 2 inches of the tubing is left free. These ends are wrapped in sterile gauze, and care should be taken that they be kept sterile.

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(3) Jour. Amer. Med. Ass'n., Aug. 23, 1919.

Irrigations are begun at once with a properly prepared and carefully titrated surgical solution of chlorinated soda (Carrel-Dakin solution) about 1 ounce to each tube every two hours. The dressings are replaced every twenty-four hours. The condition of the wound and discharge governs the frequency and amount of solution to be used during the ensuing twenty-four hours. Ordinarily, no change is made in the orders for the first two days. After this the irrigation is continued every two hours during the day, but the night period is extended to four hours. As the secretion decreases, the frequency of irrigation is diminished. Usually in from four to eight days the wound is sterile. If one has access to a laboratory, this can be ascertained by removing one of the tubes and taking a culture by the ordinary method with a platinum loop. If the laboratory is not available, one will have to use his judgment and be guided by the appearance of the wound, and the amount and character of the secretion. The latter when sterile is of a serous nature and should only slightly stain the dressing. It is frequently found unnecessary to retain both tubes longer than three days.

Supramastoid Saprogenic Pneumatocele in Chronic Mastoiditis. By supramastoid pneumatocele is meant an accumulation of air or gas between the bone and the overlying soft structures which may spread upward, forward and backward from the mastoid. It occurs usually as a result of a bony defect in the cortex of the mastoid whereby the air from the mastoid cells reaches the periosteum and strips it from the bone.

The case reported by O. Mock[4] occurred in a child of 4 years who had suffered from a chronic suppurative otitis media for three years. Following two days of severe pain a markedly fluctuating mass appeared behind the ear extending over the auricle and also backwards for a distance of over an inch.

At operation no pus was found but when the periosteum was incised a very foul odor escaped. The cortex was found intact, there being no fistula or open squamomastoid suture. The mastoid process when opened contained no pus or granulations but was colored light green in spots. A small amount of greenish-yellow fetid pus was found in the antrum. The middle ear also contained pus and granulations.

The author believes that the foul gases generated in the antrum found their way to the surface by means of the bony canals of the blood-vessels, there being no other possible way of escape. The large swelling caused by the gaseous accumulation under the periosteum was extremely tender to the touch and had every appearance of a subperiosteal abscess.

THE INTERNAL EAR.

Labyrinth Infection. The manner in which the labyrinth becomes infected from suppurative processes in the tympanic cavity is considered by J. Friesner.[5]

An infectious labyrinthitis can occur with either an acute or a chronic middle-ear suppuration, but chronic purulent otitis is, of course, by far the more common cause. Among the acute middle-ear infections, that

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(4) Zeitschr. f. Ohrenhlk., Vol. 73, No. 4.
(5) Amer. Jour. Surg., May, 1920.

associated with scarlatina ranks easily as the prime cause of labyrinthine invasion. Because of the virulence of the attacking organism, there is rapid sloughing of the tissues of the middle ear, and often caries of the outer labyrinthine wall. There may be perforation of the secondary tympanic membrane or the annular ligament, the mucous membrane covering these structures having been quickly destroyed. Thus, the labyrinth becomes involved and, depending on the extent of this invasion, is partially or wholly destroyed. Even in fulminating processes, however, such as complicate scarlatina, the pathway of the labyrinthine invasion strongly influences not only the extent of destruction within the labyrinth itself, but also the type of endocranial complication, should such occur.

When the labyrinth is invaded through its solid bony walls, it seems that the endolabyrinthine structures are better able to marshal their forces against the attack than when the infection penetrates the windows. Invasion of the labyrinth through its windows leads much more frequently to immediately fatal complications than does invasion through the bony capsule. Thus it is that a dispute has arisen regarding the most frequent pathway of labyrinthine invasion. There is no question that clinical observation shows an overwhelming predominance of fistulas in the semicircular canal; while, on the other hand, pathologic examination shows fistulas in the windows the most common pathway.

An inflammation of the bony labyrinthine capsule, a paralabyrinthitis, secondary to tympanic disease, is at first of necessity a circumscribed process. There may, however, be several isolated points of attack, so that, as the process progresses, there may be one or several primary fistulas eroded through the bony covering of the membranous labyrinth. The latter is not involved. As a rule, there is but a single primary fistula and its favorite site is at the point of maximum exposure of the external semicircular canal.

A paralabyrinthitis with fistula usually follows chronic middle-ear suppuration, either with cholesteatoma or tuberculosis. It must not be forgotten, however, that a fistula may occur with an acute, or at least a subacute mastoiditis. When the middle-ear disease attacks the labyrinthine capsule, the interior of the labyrinth near that portion of the capsule attacked reacts against the infection. The endosteum and the trabeculae which hold the membranous static labyrinth in position become thickened. It is this marshalling of forces to resist invasion that, in all probability, causes the labyrinthine symptoms before the paralabyrinthitis has resulted in the formation of a definite fistula.

When the middle-ear infection has penetrated the bony capsule of the labyrinth it begins to involve the membranous structures. Provided these successfully resist the invasion, the infection may, for a time, be circumscribed to a part of the labyrinth interior. Sooner or later, however, the membranous labyrinth becomes generally involved. A diffuse labyrinthitis may be secondary to a circumscribed endolabyrinthine process or it may result directly from penetration through the labyrinth windows. Such a condition has been described complicating scarlatina. It occurs, too, with the chronic otitides. The word penetrate is preferable to perforate, since it has been shown that bacteria may enter through an unruptured anular ligament or an intact secondary tympanic membrane.

Owing to the peculiar arrangement of the brain membranes in the internal auditory canal, every diffuse labyrinthitis is a circumscribed meningitis. The dura lines the bony walls of the auditory canal. The arachnoid follows the nerves into the canal. It is loosely attached to the nerves and, as the latter extend into the canal, the arachnoid separates from them, to be attached to the rim of the fundus. Thus, there is surrounding the nerves a funnel-shaped subarachnoid space communicating through the lymph sheaths around the vessels and nerves with the interior of the labyrinth.

After the labyrinth has become filled with pus, granulations form from the endosteum and inner surface of the bony capsule. These granulations gradually extend into the internal auditory canal and here compress, occlude and destroy the sole nutrient vessel of the bony labyrinth. It is true there are small anastomotic vessels between the circulation in the labyrinthine capsule and that of the middle-ear, but these must play an insignificant part in the nutrition of the bone, for although they have been shown chiefly in the promontory, yet when necrosis attacks the labyrinth, the cochlea is the part most frequently extruded. When the nutrition of the bony labyrinth is thus destroyed, it dies *en masse* and a sequestrum forms, which is surrounded by granulation tissues. Often these granulations grow on the dura not only of the posterior fossa but also of the middle fossa.

Deep-Seated Epidural Abscess Without Labyrinthitis Causing Meningitis. Hepe's[6] case occurred in a man of 36, who four weeks after a simple mastoid operation developed increasing discharge from the ear with symptoms of retention. A second operation was performed and the antrum found partly closed in and filled with pus. Within twenty-four hours, the man became much worse. The temperature rose and there appeared a spontaneous nystagmus to the affected side. The eyegrounds were negative, Kernig sign was negative and the patellar reflexes were normal. Meningitis was diagnosed through typical spinal-fluid findings.

Inasmuch as the previous operation had shown no point of entry for the infection from the mastoid to the meninges, and considering the labyrinthine symptoms (deafness, negative caloric test and spontaneous nystagmus) it was supposed that the labyrinth was the focal point and, therefore, it was immediately opened and drained. Strange to say no pus was found in the labyrinth; the fluid was normal and the bony capsule found intact. Following the operation the symptoms of meningitis became more frank and the patient succumbed on the sixth day.

At autopsy the temporal bone was carefully removed and sectioned. Microscopic examinations of the portions of the labyrinth remaining including the membranous cochlea failed to show any indications of a cellular exudate or proliferative process such as would be present in a labyrinthitis. However, a localized abscess was found outside the cochlear wall separated from the carotid canal by a thin plate of bone and entirely shut

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(6) Zeitschr. f. Ohrenhlk., Vol. 74, No. 2.

in on all sides except posteriorly where it had broken through the dura into the posterior fossa just below the internal auditory meatus. Sections showed that the abscess had its origin on the mastoid whence it had passed *via* some cells just below the labyrinth to the subdural space, these cells being very unusual in this location.

The abscess had not been discovered at any of the operations and was found only at the autopsy.

Two Cases of Labyrinthine Fistula. Brindel[7] has seen a rather large number of soldiers, operated on recently, or some time before, either by simple clearing out of the mastoid or of the petromastoid, and who complained of vertigo, which they asserted prevented them from military service. Minute examination of the middle ear and the equilibrating mechanism readily proved most of these individuals were malingering. Some who really had vertigo were affected with a lesion of the labyrinth, which being relieved immediately put a stop to the vertigo.

The two fistulae referred to were in a nun, and a young officer. The former had been operated on eight years before for radical cure of otorrhea, and had a fistula persisting on the inner wall of the middle ear. The officer had recrudescence of an old otorrhea, and showed a point of necrosis in the bony labyrinth. In both instances, the fistula closed after curettage of the labyrinth, and suppression of the focus of suppuration.

Motion Sensing. Interesting experiments in motion sensing in linear upward and downward direction have been made by the Air Medical Service and reported by E. R. Lewis[8] as follows:

One of the methods of approaching the problem of determining what is the relative value of the various sensory contributions to the individual's total knowledge concerning motion was a series of experiments performed in a bank of elevators capable of performing vertically upright trips forty stories in extent, a height of over 400 feet, at a maximum speed of 1,000 feet a minute. For this purpose four groups of individuals

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(7) Progrès méd., Oct. 11, 1919.
(8) Ann. Otol., Rhinol. and Laryngol., March, 1919.

were selected, namely, (1) normals, (2) deaf-mutes totally lacking vestibular perception, (3) deaf-mutes possessing vestibular perceptions in various degrees below the normal, and (4) tabetics whose deep sensibility was impaired to various degrees. These experiments were carried out during a period of six weeks, with a view to determining the average ability of each group to sense the various vertically up and down movements to which they were subjected. The elevator shafts were entirely dark, and the lights on the cars were shut off during the experiments, so that no information reached the individual *via* the visual tract. Each individual of the normal group was first determined to be possessed of normal vestibular and deep sensibility.

The following is a digest of the findings:

Group 1. Findings in Normals:

Acceleration: During acceleration upward all were able to sense accurately the character of the motion to which they were subjected.

Sustained Speed: A slower sustained rate of speed immediately ensuing upon acceleration upward was uniformly misinterpreted as arrest of motion or as very slow motion.

Retardation: Retardation to the slowest possible continued speed upward, ensuing upon sustained speed upward, was universally sensed as motion vertically downward.

Group 2. Findings in Dead Vestibule Deaf-Mutes:

The deaf-mutes in whom the vestibular function was totally abrogated sensed acceleration upward correctly.

These individuals were uniformly inconsistent in describing the character of slow motion vertically upward at a constant rate of speed, sometimes guessing "upward" and sometimes guessing "downward," but always acutely sensitive to the fact that they were undergoing motion of some kind.

Retardation, ensuing upon motion vertically upward at a sustained rate of speed, was uniformly correctly sensed by these individuals.

Arrest of motion ensuing upon retardation or motion at a sustained rate of speed was uniformly correctly sensed by these individuals.

In these individuals it was impossible to produce the illusion of reversal of motion by alteration in the speed of the car. It was apparent that absence of hearing and vestibular sense had keyed up to a high degree of attention and sensitiveness the deep sensibility tract, though it is not believed that this observation justifies a statement that the sensing of the deep sensibility impulses was keener than that of the normal individual. It seems certain, however, that the attentions of these individuals to motion perceptions coming in *via* the deep sensibility tract were more intense than that of the ordinary normal individual.

Group 3. Findings in Live Vestibule Deaf-Mutes:

Deaf-mutes in possession of intact vestibular apparatus and normal acuity of perception absolutely duplicated the findings of the first group of full normal individuals tested, as shown in items 1, 2 and 3 of this digest of results.

Deaf-mutes in whom acuity of vestibular perception was reduced to an index represented by two or three seconds' duration of nystagmus and no past-pointing and almost absent falling were able to sense acceleration vertically upward correctly and failed to identify slower motion at a sustained rate of speed upward, but sensed the motion very positively, though labeling it at times "motion downward" and at other times "motion upward"; they were able to detect retardation and arrest keenly, but did not experience the illusion of reversal of motion either following acceleration, retardation or arrest of motion.

Group 4. Findings in Tabetics.

Tabetics in whom vestibular tests had demonstrated the presence of normal vestibular functions were roughly of two classes—the lower or dorsolumbosacral type and the higher or the cervicodorsal type. Both types evidenced a satisfactory ability to sense acceleration of motion vertically upward; slower motion at a sustained rate of speed ensuing upon this acceleration upward was not sensed at all by either type; retardation following motion vertically upward at a sustained rate of speed was sensed as motion downward by both types. Particularly striking was the continuation over long periods of time of the sensing of motion downward by the first type of tabetics when arrest of motion ensued upon retardation vertically upward. Several of these cases continued to indicate motion downward for from thirty to sixty seconds following total arrest of motion. This was not the case with the second type of tabetics, several of whom, however, did indicate sensation of motion downward for a few seconds following total arrest of motion.

Downward motions: Acceleration of motion downward from the fortieth floor was correctly sensed by normals, both types of deafmutes, and both types of tabetics.

Slower motion downward at a sustained rate of speed ensuing upon rapid acceleration downward was sensed by the normals universally, as either complete cessation of motion or extremely slow motion in a downward direction; this was also the case with the second group of deaf-mutes, those in possession of vestibular functions; the first groups of deaf-mutes were unable to sense the character of sustained motion downward accurately, but more frequently guessed "downwards" than "upwards"; the tabetic of either type indicated almost invariably arrest of motion.

Retardation downward ensuing upon motion at sustained rate of speed downward was sensed as arrest of motion or as slow motion upward by the normal group and by the deaf-mutes in possession of vestibular function and by both types of tabetics. This confusion of sensing between arrest and slow motion upward was consistent with all members of these groups, but individuals in each group varied in their answers, one individual sometimes indicating arrest and at other times indicating slow motion upward.

Arrest of motion ensuing upon retardation downward was uniformly indicated as slow motion upward by the group of normals; the group of deaf-mutes in possession of vestibular function sensed this as slow motion upward only for a second or two and then indicated properly total arrest of motion; the group of deaf-mutes totally lacking vestibular perception uniformly indicated correct perception of arrest of motion on the instant; both types of tabetics indicated sensation of motion vertically upward, and this sensation continued for a much longer period of time than in the normal group.

The Aural Significance of Vertigo. In discussing this subject, Irving W. Voorhees[9] says:

Our knowledge concerning our relations in space is derived from three sources: (1) Through kinesthetic sensations supplied through nerves of sensation to the skin, muscles, joints and tendons; (2) through the six eye muscles in connection with the optic nerve and ciliary muscle; (3) through the static end-organs, that is, the semicircular canals and the terminal filaments of the vestibular nerves as affected through movements of the endolymph.

It follows, therefore, that any disturbance in these organs or their central relations which lies outside of the norm of ordinary experience will result in bewilderment or confusion when we try to estimate our spatial position. Both Ewald and Hitzig have tried to set down in definitive form what they understand by the word "dizziness," but they have not clarified the matter thereby. The shortest and, perhaps, the best working definition of dizziness is that it expresses perplexity or uncertainty concerning the position of our bodies in space.

Some of the general principles underlying the subject of dizziness are:

1. Dizziness is a subjective symptom consisting of perception of a diminished state of consciousness by the person affected.

2. The center for its production has not yet been found, but it is supposed to be in the cerebrum. Likewise the nerve paths which connect it with the balance

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(9) New York Med. Jour., February, 1920.

center assumed to exist in the medulla are not yet known.

3. Function of the dizzy center comes by way of the balance center. In the balance center all stimuli meet which influence the statics or dynamics of the body in any way. To this balance center are conducted the disturbed body sensations.

4. Out from this balance center go also the objective signs of dizziness.

5. To these abnormal sensations belong stimuli which go out from the dizzy center, from the eyes, from the vestibule of the labyrinth and from the kinesthetic organs.

6. Labyrinth stimuli work especially upon the balance center. Experimentally, they are the galvanic turning, caloric and mechanical reactions.

7. The labyrinth has a special tonus function on the body muscles. Increase of this tonus leads to muscle contraction.

8. This tonus is exaggerated at the cathode, by the movement of endolymph in the horizontal semicircular canals from the smooth end toward the ampullae. In the other canals (anterior and posterior vertical) stimulation takes place from the ampulla toward the smooth end. Warmth also increases the tonus function; while all other stimuli diminish it.

9. Objective dizziness can be produced by exaggerated centripetal stimulation of the balance center. Centrifugal muscle impulses from the balance center can likewise produce dizziness. Dizziness also takes place when the impulses from the cerebellum "miss fire."

10. The balance center in the medulla and the dizzy center in the cerebrum function either interchangeably or independently. There may be objective dizziness without loss of consciousness; for example, in an animal decerebrized. Likewise, there may be subjective sensations of dizziness without loss of consciousness.

11. Seasickness is produced through stimulation of the vestibular labyrinth. Excitation of the balance center then goes over to the vomiting center. If one could find some means of putting the vestibular labyrinth temporarily out of function without affecting the

cochlear function at the same time, it seems likely that seasickness could be controlled.

12. After ablation of both labyrinths, animals do not seem to be dizzy, nor can dizziness be produced in them.

The chief reason for giving some attention to dizziness is that it sometimes acts as a warning signboard which may lead quite surprisingly to an unsuspected diagnostic entity. In nearly all cases of chronic diseases of the ear, dizziness is mentioned by the patient as an important part of his concept of the clinical picture. It is also pretty generally neglected by the general physician, who ordinarily ascribes it to some disorder of the digestive tract and is content with prescribing a dose of calomel. To the aurist, however, dizziness is a warning sign calling for an extended examination of the ears. The aurist may think only of the labyrinth, but he should be ever mindful of the other causes which may be the real exciting elements, the ear being merely the organ through which some other part of the body may be signifying its disharmony.

Certain persons are apparently immune from dizziness, although such immunity is most often acquired rather than congenital. Toe dancers show a most extraordinary sense of direction and unfailing knowledge of their position, even after spinning around for several seconds like a top. The most notable example is, of course, the whirling dervishes, who are said never to be quite happy unless going through their giddy gyrations.

The types of dizziness of chief concern to the otologist are those associated with intracranial disease or with intralabyrinthine disturbances. It is sometimes very important to the neurologist to rule out the labyrinth before he can be quite sure as to the symptoms which seem to point to some intracranial lesion, and in this work the otologist should prove that his special knowledge is indispensable.

Labyrinth dizziness is the type of most interest to the otologist, and it is probably one of the commonest forms met with. The classical picture is that afforded by so-called Ménière's disease, which is rare enough as such, but has so fastened itself upon the clinical mind that no mention of dizziness is quite complete without it. From a pathologic viewpoint, Ménière's disease is labyrinthine apoplexy, that is, a hemorrhage into some portion of the labyrinth. In the severe and extensive lesions both the cochlear and vestibular portions of the labyrinth are involved, and we have to do, therefore, with deafness, noises, nystagmus, dizziness, nausea and vomiting. Rarer symptoms are fullness in the head, cerebellar ataxia and diarrhea. The disease picture is usually a concomitant part of some disorder of the blood, such as pernicious anemia or chlorosis. Occasionally skull fractures with involvement of the petrous portion of the temporal, fissure of the pyramid, or injury of the vestibular nerve, are the very sufficient causes of this type of labyrinth dizziness.

Attacks of vestibular dizziness are associated with three groups of symptoms: (1) Intensive feeling of dizziness and marked vestibular ataxia; (2) spontaneous nystagmus of at least second degree severity; (3) intensive headache at the base of the skull or at the back of the neck, sometimes constant in character.

Attacks of labyrinth dizziness belong first of all to circumscribed labyrinth disease. The dizziness sets in suddenly, with periods of relief followed by fresh attacks, until finally the patient must consult a physician. Such attacks have been known to persist for years without the true origin in the labyrinth having been discovered. As a rule, the cases which must eventually come to operation have experienced attacks of dizziness over a period of from two days to five weeks. Ruttin says that in fifty cases of circumscribed and diffuse secondary serous labyrinthitis only nine gave no history of dizziness, and of these five were tuberculous. In explanation of the latter, Herzog affirms that the tuberculous process goes on so slowly that destruction of the labyrinth in its entirety may take place without producing any symptoms that would bring the patient to the otologist. Such patients are often too ill to pay attention to anything save the gravest disturbances.

In certain cases dizziness is not present when the patient comes for examination but can be elicited by shaking the head or bending it quickly backwards, for-wards or sideways. After exenteration of the labyrinth the dizziness usually disappears in from ten to fourteen days.

MISCELLANEOUS EAR CONDITIONS.

Paralysis of Sixth Nerve. Two cases of sixth nerve paralysis (Gradinego's syndrome) have been observed by E. H. White,[1] who reviews the report of Gradinego's 57 cases.

Gradinego's work is of great interest as explaining the somewhat unusual complication of sixth nerve involvement by otitis and also as indicating a group of cases which, if neglected, may go on to a diffuse meningitis and death.

Reviewing the fifty-seven cases White was able to classify them into three groups:

In the first group were twenty-four cases which showed a classical syndrome without other complicating features, beyond perhaps more or less inflammation of the mastoid. These cases ran a favorable course to complete healing and recovery.

In the second group there were twenty-nine cases showing a typical syndrome but complicated by other lesions, such as seventh nerve paralysis, labyrinth irritation or optic neuritis, which he regarded as independent complications of the otitis rather than characteristic of the lesion by which he explains his syndrome.

In the third group were four cases which, in addition to showing the syndrome, later developed septic meningitis and died. He regards these as a more virulent type in which the process extends to diffuse meningitis; the second group illustrates an intermediate stage between the first and third.

The characteristic features of the syndrome are mentioned in detail:

Usually the otitis in these cases is characterized by evidence of retention of pus in the middle ear, either complete or relative. This is indicated by absence of

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(1) Amer. Jour. Med. Sci., February, 1920.

or insufficient perforation of the drum. In thirty-two cases in which details are given eighteen times there is no perforation, or there was late spontaneous perforation, or paracentesis was done late. The perforation was generally too small, so that it required subsequent paracentesis. Sometimes this was repeated as many as five times. It was also striking that the situation was frequently in the anterior half of the drum. Paracentesis, or enlargement of the perforation, was generally followed by a striking remission of the symptoms, pain and paralysis, thus showing a definite relationship between the otitis and the paralysis of the sixth nerve. This remission of the paralysis after middle-ear drainage was well shown in White's first case.

Severe pain was referred to the temporal and parietal region of the side involved. The otitis is characteristically accompanied by severe pain, which, however, may subside a few days after the appearance of the discharge. This is referred to the deeper parts of the ear, or more characteristically, to the side of the head, occasionally to the retro-orbital region. It is not characteristic of a fifth nerve neuralgia, which is paroxysmal, but is more intense and continuous and is little relieved by antineuralgic remedies. It sometimes appears two or three weeks after the discharge at the time of the appearance of the paralysis.

Paralysis of the sixth nerve appears suddenly without warning, the patient sometimes complaining of a diplopia, and calls the attention of the physician to it. Paralysis does not usually appear early. In the thirty-seven cases in which the exact appearance was noted, three times it appeared early on the fifth to the tenth day; eight times it appeared from the fifteenth to the twentieth day; twenty times it appeared from the twentieth to the fiftieth day. Occasionally it is late; in six cases it was after the fifty-sixth day. It may be stated, in general terms, as occurring from three to six weeks after the beginning of the otitis. In the typical cases complete recovery usually occurs, but is liable to be slow. There are unusual cases in which the paralysis disappears rapidly, and to this type both of White's cases belong.

The complicating symptoms of the second group were suggestive of a meningeal irritation.

Complications in the mastoid were regarded as associated with a severe otitis, but having no direct bearing on the syndrome. In the fifty-seven cases there were only twenty-four in which a mastoid operation was done; usually it was for the purpose of free drainage of the middle ear rather than for the relief of symptoms pointing to a mastoid involvement. The findings in the mastoid at operation were usually an inflamed mastoid without severe local disease, although in some cases there was mastoid abscess or even a perisinus abscess.

Chloroma Simulating Mastoid Disease. E. C. Lewis[2] reports that sixty-five cases of chloroma are found in the literature but none seems to have had its beginning in the mastoid. His patient, a boy, aged 10, was admitted to hospital on June 14, 1919, complaining of pain and discharge from the right ear. His temperature was 99.6° F. and pulse 104, and on examination he was found to have a tender swelling behind the right ear over the mastoid process, enlargement of the upper cervical glands on that side, and right facial paralysis of the complete type. A diagnosis of tuberculous mastoiditis was made, and the mastoid antrum was opened, revealing the presence of a small amount of pus and a quantity of greenish-looking granulation tissue. The patient's condition improved steadily for about a week, and he then began to suffer from retention of urine and marked constipation; there was no vomiting or headache, and the optic discs were normal. From this time onward the temperature fluctuated, rising to 100° or 101° F. every evening, with corresponding increase of pulse-rate, which varied from 90 to 116. Examination of the cerebrospinal fluid showed it to be normal as to pressure, content, and sterility; the Wassermann reaction was negative in cerebrospinal fluid and blood.

The first blood count, done on June 23, revealed an apparent condition of lymphatic leukemia; the figures were: R. B. C. 2,091,000, W. B. C. 19,800, Hb 40 per cent., polymorphonuclears 7.5 per cent., lymphocytes

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(2) Lancet, Nov. 8, 1919.

91 per cent., eosinophiles 1 per cent., basophiles 0.5 per cent. On June 30, the patient had severe epistaxis and complained of pain across the back at about the level of the eighth dorsal spine, and on July 16 he developed a left-sided facial paralysis. By this time the facial paralysis on the right side had greatly improved, and it had recovered completely before his death on August 4. There was at no time any affection of the other cranial nerves. July 21 a very slight bilateral enlargement of the inguinal glands was noted, and also a movable nodule the size of a pea about 1 inch to the left of the sternum in the third intercostal space. The liver was slightly enlarged. The blood count showed a steady increase in the number of leukocytes, and the last one before death gave the following numbers: R. B. C. 945,000, W. B. C. 37,200, Hb 23 per cent., polymorphonuclears 2 per cent., lymphocytes 30 per cent., large mononuclears 6 per cent., myelocytes 2 per cent. The lymphocytes were all of the large variety and a very few normoblasts were seen; there was slight polychromasia and variation in shape and size of the red cells. The urine was normal throughout. The patient became gradually weaker and the pulse and temperature higher, fluctuating respectively between 130 and 150 and 100° and 104° F. Death occurred on August 4, seven weeks after the apparent onset of the disease.

Postmortem Appearances: The mastoid wound was reopened and somewhat enlarged, and it was found that the bone was rather soft and looked greenish-yellow on the cut surface; the antrum was filled with a soft greenish substance which was removed for examination.

Spinal column and cord:—There were numerous flattened greenish-yellow masses on either side and in front of the bodies of the vertebrae in the thorax and abdomen and the largest which measured 6x3 in. was invading the right psoas muscle. These masses were all closely incorporated with the periosteum, but did not invade the bone; the periosteum could be stripped cleanly off the bone, bringing the tumor with it. A similar substance was found in the posterior part of the vertebral canal in the mid-dorsal region and was pressing on the spinal cord.

Skeletal system.—A nodule of greenish-yellow tissue about the size of a half dollar was situated immediately to the left of the sternum between the second and third costal cartilages towards the anterior surface. On the posterior surface this mass extended from the first to the fourth costal cartilage. Numerous greenish masses were incorporated with the periosteum on the inner surface of the ribs. In the upper end of the right femur the periosteum and bone appeared normal; the marrow was slightly greenish-yellow in color.

Lungs.—There were small masses of lymphoid tissue on the surface of both lungs and numerous petechial hemorrhages on the external and cut surfaces. Large lymphatic glands were found at the roots of both lungs; these showed no greenish-yellow coloration.

Pericardium.—Many petechial hemorrhages. One or two greenish nodules the size of a pea on the cardiac surface.

Heart.—Many petechial hemorrhages.

Blood-vessels were normal. Thymus was normal.

Stomach.—Mucosa showed several irregular raised greenish-yellow patches, firm and hard to the touch; some small submucous hemorrhages.

Duodenum.—A few large greenish-yellow masses on the mucous surface, chiefly in the first part. The remainder of the small intestine was normal.

Large intestine.—Numerous similar nodules the size of a pin's head.

Liver.—Surface slightly nutmeg with some fatty change.

Spleen.—Surface mottled: pulp a dirty yellowish-brown.

Pancreas.—Invaded by a few small greenish-yellow nodules.

Kidneys.—Left: The whole surface was studded with greenish-yellow masses from a pin's head to a cent in size; these masses were firm and hard to the touch and scattered throughout the whole kidney. The intervening tissue was mottled dark red with hemorrhages. The capsule stripped easily. Right: Condition similar but less marked.

Suprarenal capsules appeared normal. Lymphatic glands were somewhat enlarged in neck, axillae, and groins; the latter only could be examined and showed no greenish coloration. The mesenteric glands were enlarged, discrete, and purplish-red.

Mouth and tongue appeared normal on external examination. Larynx, traches, and thyroid gland could not be examined.

Microscopic Appearances: The bone marrow from the femur showed great hyperplasia of all the normal narrow cells, no particular type of cell predominating. In the kidney a section through one of the nodules showed many cells resembling plasma cells together with small round cells and a few with multiple nuclei. The plasma cells contained an eccentric nucleus approximately the size of a lymphocyte, and their protoplasm stained a faint mauve in an eosin-hematoxylin preparation. There were numerous thin-walled vessels and the whole appearance was strikingly reminiscent of granulation tissue. In other regions of the kidney, the tubules were separated by collections of similar cells. In the pancreas, there was a similar infiltration, with pushing apart of the acini. The spleen and lymph glands appeared normal. In the stomach the mucous membrane showed evidence of postmortem necrosis, and contained a few small collections of cells as above. In the liver the cells forming the greater part of the center of each lobule were necrosed, and intralobular veins were widely dilated. There were no lymphoid masses, such as occur in lymphatic leukemia, and no infiltration resembling that in the other organs. The tissue from the mastoid antrum was composed of cells of the same type as above, as were also the nodules growing from the periosteum of the several bones; in the parts where muscle had been invaded the fibers were degenerate.

Earache. Patients suffering from earache are classified into four groups by H. B. Blackwell,[3] based upon anatomic, etiologic and therapeutic grounds.

1. Those produced by an inflammation behind the tympanic membrane, the infection originating in the nose and throat and being introduced into the middle ear by way of the Eustachian tube. The attack is

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(3) New York Med. Jour., June 21, 1919.

usually preceded by an inflammation of the upper air passages. An aural examination reveals a more or less inflamed or bulging drum head. It may, however, be covered with a white necrotic epithelium, which on being removed reveals an underlying deeply injected membrana tympani, very sensitive to the touch of a cotton wound applicator. The pain of a middle-ear abscess is steady and boring in character, it is located directly in the ear, and is more or less continuous. As a rule it is relieved only by incision or spontaneous rupture of the drum.

2. In cases of this class the earache is produced by inflammation of the soft parts of the external auditory canal, commonly known as external otitis or furunculosis. It frequently develops in individuals suffering from eczema of the ear, who are in the habit of scratching the canal with some hard substance to relieve the sensation of itching. It sometimes follows faulty attempts to remove wax or foreign bodies from the canal. In summer it often occurs in persons accustomed to daily sea baths, the frequent submersions causing excessive dryness of the auditory canal epithelium. An aural examination reveals a more or less swollen and sensitive external auditory canal. By the careful use of a small speculum the drum head may possibly be observed. It frequently shows some sympathetic congestion but is otherwise normal in appearance. The tragus or auricle is nearly always very sensitive to the slightest touch or traction, and the pain is usually increased by mastication. This is a valuable point in differentiating between the pain in this condition and that resulting from other causes. Often there is some slight painful enlargement of the lymphatic glands situated about the auricle. In most of these cases the pain is more throbbing in character than in a middle-ear abscess, and it is usually increased by lying down or leaning forward.

3. Earache in which there is no inflammation present in either the middle ear or external auditory canal is known as otalgia. The pain is neuralgic and reflex, being referred from other regions, *e. g.*, the teeth, nose or throat. The otalgia which accompanies a peritonsillar abscess or follows a tonsillectomy is an example. These

patients are often neurasthenic. Usually the pain is not located directly in the ear, but in the region around it and is not so intense as in the other classes. An aural examination shows a normal drum and auditory canal.

4. Earache which is largely mechanical and chiefly confined to children and infants suffering from enlarged tonsils and adenoids is very common and nearly always nocturnal, as a rule recurring several nights successively. Mechanically the etiology is as follows: The prone position of the sleeping patient increases the congestion in the nasal pharynx, resulting in temporary closing of the Eustachian tube thereby converting the middle ear into a closed cavity; the blood circulating in the walls of this cavity soon absorbs its contained oxygen thus inducing negative pressure. The ear drum being the only large yielding surface in the tympanic walls responding to physical law retracts sharply. The patient awakens suddenly with an earache and immediately starts to cry vigorously. The act of crying forces open the Eustachian tube, relieving the negative pressure in the middle ear, the pain then soon ceases and the patient returns to sleep. Aural examination soon shows the membrana tympani to be normal, save for more or less retraction with possibly some congestion during the attack.

It sometimes happens that an earache is produced by a combination of some of the factors mentioned above, *e. g.*, furunculosis of the canal associated with an acute or chronic middle-ear abscess. In these cases the clinical evidence is of most value in determining what is the cause of the pain and the utmost skill may be required to diagnose and treat the condition.

Removal of Cerumen. Suggestions on the use of the syringe for removal of cerumen are given by T. B. Layton.[4]

Two rules may be laid down. First, that water at the body temperature must be used; secondly, that for wax the syringing must be done vigorously, and for pus it must be done gently. To each of these rules there is an exception; to the first when the observer wishes to produce giddiness to test the function of the vestibular

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(4) Practitioner, April, 1920.

nerve; to the second when the patient has earache, and may have an acute otitis media, or other painful lesion, beneath the plug of wax.

To remove wax from the ear may be a most difficult task; it needs great gentleness, and may need very great patience on the part of the surgeon, as well as the most careful handling of his patient.

A common cause of failure and mistakes is the neglect to use the head mirror and the speculum. Often a patient will say that when he had his ears syringed, nothing came out, and on examination a normal empty external auditory meatus is seen. Or the patient says he had his ears syringed, that much wax was removed, but that since the syringing he has been very deaf, and in such a case the deeper wax is found still to be present softened and swollen by the moisture. A plug of hard dry wax may cause little or no deafness, but when part of this is removed the remainder takes up moisture and completely fills the lumen of the meatus, thus preventing the sound-waves reaching the drum. All such cases would be obviated by the use of the head mirror. Nor need it be thought that this means that only specialists can syringe ears. It does not need much acquaintance with an aural speculum to see whether the ear is empty of wax or not. It is not necessary to say whether the drum-head is normal or not, and the necessary skill can be acquired by an intelligent nurse.

One type of ear which is most difficult to get clean, is that with soft wax present in quantities not large enough to obstruct the lumen, but sufficient to narrow it and to stick to the end of the speculum as it is inserted; with this is a debris of moist epithelium softened and half-liquefied, so that it looks like pus, with which it may be mixed. Syringing with water leaves some sticking to the fine hairs at the opening of the auditory meatus, and the view remains obstructed. Such ears can best be cleaned by using a mop of absorbent cotton soaked in liquid paraffin, which is a solvent of fat. This removes the epithelial debris and inspissated pus, and brushes down the small hairs so that they lie flat. It may be used, too, for ears full of sand and dust when these are causing a dermatitis.

The cleaning of ears is harder in children, and most difficult of all is that case in which it is most important, namely, the child with earache. To puncture the drum at the right moment may save the mastoid from becoming inflamed; to decide as to puncture, the meatus must be cleansed. The utmost gentleness is needed in every manipulation; perhaps a little wax can be removed with the syringe, a little more with forceps, some with the paraffin mop, and the last will come away with a further use of the syringe. One rule only can be laid down, that of patience and gentleness.

Cholesteatoma. The etiology treatment and results of cholesteatoma are discussed by J. M. Smith.[5] The consensus of opinion now is that cholesteatoma is due to an over-production of epithelial tissue, the foothold having been obtained by direct extension into the middle ear, through a break in the tympanic and mucous membranes, or to a metaplasia of the tissues in the tympanitic cavity.

We have two distinct types of cholesteatoma, the encapsulated and the non-encapsulated. The encapsulated type is a pear-like sac contained in a cavity lined by a single layer of short columnar or cubical epithelium; this rests on a thin fibrovascular endosteum. The sac itself consists of a somewhat thickened fibrovascular sheath containing a few plasma cells and lined by stratified epithelium similar to the Malpighian layer of the epidermis, which consists of columnar, spheroidal and polyhedral cells in successive layers from below upward. The similarity is still further emphasized by the presence of eleidin granules in the layer which corresponds to the stratum granulosum, by prickly cells, and by the formation of papillae. The horny layer is represented by the sac contents of closely packed and laminated, acid-fast squamous cells, either devoid of nuclei, or showing their faint outline.

In the non-encapsulated type we find granuloma imbedded in loose lymphocytes, leukocytes and myelocytes in all stages of fatty and granular changes, blood, pus and numerous bacteria of all kinds, spicules of bone, squamous cells in loose or laminated pearls. Observa-

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(5) New York Med. Jour., March 20, 1920.

tion of discharges, curettings, swabs and other morbid material, such as granulations, polypi and neoplasms from the middle ear, together with postmortem search, prove that the normal epithelium is invariably replaced by squamous cells after prolonged persistence of perforation.

The metaplasis is not confined to the tympanitic cavity, but it involves the adjacent pneumatic space and its contents. The new squamous epithelium, judging by comparison with cutaneous activity, is probably produced more rapidly and more abundantly than the normal columnar, and there can be little doubt that the cytolysis and disposal are also much more difficult.

It is also well to remember that cases of cholesteatoma have been reported with no evidence of a perforation in the drum membrane. This is probably explained by the perforation having closed after the process had got a start. Whether we have a true metaplasia or a direct extension due to a break in the mucous membrane, the results are the same, since we have an over-production of the epithelial elements, and cholesteatoma results.

It is not possible to make a diagnosis of this condition in all cases. We may be able to remove some of the cheesy mass directly from the external auditory canal or tympanum. Smears made from a chronic discharging ear showing repeatedly dead epithelium and cholesterin crystals may lead us to anticipate it.

Once having definitely determined the presence of a cholesteatoma, there is but one thing to do, and that is a radical operation. By the operation we enlarge the auditory canal and convert the middle ear, the antrum and the mastoid into one continuous cavity. If we are thorough in our operation and in the after-treatment prevent the formation of granulation tissue, then we get the cavity to dermatize, and a cure results.

It is important in any radical operation to be thorough, but we must be especially thorough when we are dealing with this condition. The field should be rendered smooth and as free as possible from any bony recesses and then a most careful and painstaking daily after-treatment maintained.

After a complete cure, there may be a recurrence due to neglect of the cavity. Patients should be kept under observation and examined at least once in six weeks. The patient can not properly cleanse the whole area, and the dead epithelium, cerumen, and other material if allowed to collect, will cause ulceration with discharge, and possibly a recurrence of the cholesteatoma itself.

After reporting five cases in which the patients had been operated upon, Smith offers the following conclusions:

The cause is an over-production of epithelial tissue in the tympanum and mastoid. The danger is that of intracranial infection, either brain abscess, sinus thrombosis, or meningitis. The treatment is radical operation. Prognosis is good, if operation is performed before intracranial complications occur. The hearing is not so good as that following the ordinary radical mastoid operation.

Rupture of the Drum Membrane from Shell Explosions. The experience of F. Chavanne[6] covers a series of 543 cases of rupture of the drum following the detonation of high explosives, of which 469 were complicated by acute suppurative otitis media. This large percentage of infections is attributable to exposure to bad weather following the injury, infection from without and concurrent nasopharyngeal infection. Most of the lacerations assumed a linear form: a few were punctiform or involved the entire drum. More than half occurred in the anterior inferior quadrant and the linear lacerations were nearly all vertical. The majority of the suppurations following cleared up without complications. Only thirty-five out of the 543 became chronic and mastoiditis ensued in only eleven. More than half of the patients were cured and able to leave the hospital within two months.

NEW INSTRUMENT.

New Ear Speculum. A new ear speculum has been devised by Douglas Guthrie[7] which possesses advantages over those in ordinary use, especially in the examination of children. The advantages claimed are:

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(6) Oto-Rhino-Laryngologie, Internat., April, 1919.
(7) Lancet, March 20, 1920.

1. The good grip, afforded by the addition of a broad flange to the base, enables one more readily to follow and control the movements of the child's head.

2. The distal extremity is bevelled so as to correspond with the obliquity of the tympanic membrane when in position—the notch in the margin of the speculum should point upwards and backward.

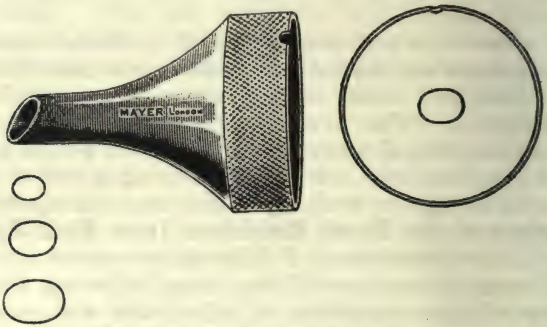

Fig. 27. Improved ear speculum.

3. The instrument does not taper to a point, the terminal 10 mm. forming a tube of uniform caliber.

4. This tube is oval on cross section, but, owing to the bevelling, the distal opening is circular.

5. The plating is polished outside but dull within, and the speculum is made in three sizes, having terminal apertures of 3 mm., 4.5 mm., and 6 mm., the larger sizes being for adult use (Fig. 27).

The Nose and Throat

GEORGE E. SHAMBAUGH, M. D.

DISEASES OF THE NOSE AND THROAT.

GENERAL CONSIDERATIONS.

Graduate Teaching of Otolaryngology. The function of undergraduate teaching of otolaryngology according to L. A. Dean[1] is to make the medical student conversant with otolaryngology to such an extent that he will know those things that are essential for general diagnosis and therapy, and to convince him that work in the otolaryngologic field is so specialized that it should be attempted only by those specially prepared.

The time allowed for undergraduate teaching of otolaryngology is barely sufficient to accomplish these two things. The teaching of graduate otolaryngology is in a wholly undeveloped state.

The experiences during the war indicate the necessity of standardizing the requirements for the practice of otolaryngology. It is most essential in the development of the specialist that he be so well prepared in general medicine that he will not overrate the importance of his specialty. He must not feel that because disease of the nasal sinuses, and a lesion of the optic nerve coexist, the latter is necessarily the result of the former. It is essential for the student to do a large part of his work in hospitals where a large percentage of the special cases are seen by representatives from other departments, dermatology, neurology, psychiatry, internal medicine, general surgery, genito-urinary surgery, etc., and where he sees, as consultant, a large number of cases that logically belong to the other specialties. In this way only will he secure the proper point of view of a specialist. The clinical teacher in the fundamentals of graduate otolaryngology must be one who is willing to

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(1) Jour. Amer. Med. Ass'n., July 19, 1919.

place the teaching first, and private practice second. The clinical man who teaches the fundamentals must carry out a regular routine work. The clinical teacher of the fundamentals of graduate laryngology should spend at least one half day with the student. He should have the regular ward walks; he should supervise the clinical charts; every case the student has in his care he should go over with him; he must conduct seminar work; he must teach thoroughly the diagnostic technique, and he should have these men assist him at the operating table, and then later supervise every move they make when they are themselves operating. No student should be allowed to attempt any operation until he has mastered it in the mortuary. Complete systematic courses in anatomy, pathology and bacteriology are essential. A man is better qualified for the practice of otolaryngology who has a thorough knowledge of the anatomy and pathology of the subject, with little clinical experience, than one who has had the clinical experience and little anatomy and pathology. A standard degree indicating proficiency in otolaryngology satisfactory to all schools should be established. The degree should be granted by the universities and medical schools. In no other way can it be standardized and kept on a high plane. The degree should be an earned degree. It should not be granted on a basis of examination alone. The degree of Ph.D. with the qualifying term, such as Ph.D. (otolaryngology), written in the diploma but not included in the title or degree conferred on the individual, meets with much approval. Three years of work is required for it. This is not too much work for those who wish to excel in otolaryngology. The desire should be not to make more otolaryngologists but better otolaryngologists.

[A very serious error is being made in some institutions by attempting to teach undergraduates, and especially internes in hospitals, the technique of operations on the nose and throat, such as the operation for the removal of tonsils, or of the turbinated bodies. The technique of operating should be taught only as the last step in the training of the specialist. The general practitioner who attempts to do such operations can not avoid doing unnecessary operating for the simple reason that he does not have the training to diagnose the conditions requiring such operations. It is a long process to teach a man the diagnosis of nose and throat disease, and to train him to recognize the conditions requiring operative treatment. It is a relatively simple matter to teach the technique of operations.—Ed.]

Physiology of Sneezing. The act of sneezing is subdivided by A. P. Brubaker[2] into two phases, a nasal and a respiratory, both of which are reflex in character and involve two different reflex mechanisms, a nasal and a respiratory. Each mechanism consists of afferent nerves, a central mechanism, affected nerves and responsive organs. The effective portion of the sneeze is the respiratory phase. The stimulus adequate to the excitation of the sneezing mechanism is the production and discharge of a secretion from glands in the nasal mucous membrane. The production of this secretion is also a reflex act and involves a nerve mechanism consisting of afferent nerves, central cells, efferent nerves and their related responsive organs, glands and blood vessels. Collectively their physiologic action constitutes the nasal phase of sneezing. The afferent portion of the mechanism is widely distributed, though it may be said to consist mainly of (1) cutaneous nerves, (2) nasal branches of the trigeminal, (3) visceral afferent nerves, and (4) nerves descending from the cerebrum.

It is quite apparent that pathologic conditions might arise from an alteration in the way of an increase in the irritability of the afferent portion of the mechanism of the nasal phase of the reflex. Local pathologic states frequently so exalt the irritability of the nerve endings that a slight additional stimulation develops a greater number of nerve impulses than would otherwise be the case. As a result, the associated central cells are more profoundly stimulated and cause by their greater discharge of energy more pronounced peripheral effects. It not infrequently happens, also, that the nerve impulses thus developed are so numerous that they overflow their customary channels and stimulate vasodilator, secretomotor and visceromotor centers in different levels of the medulla oblongata and the spinal cord, causing, in addition, the development of pathologic phenomena in the respiratory, the circulatory and other organs as well. Instability of the central mechanism, either in itself or as an expression of a more general nerve cell instability, the result of heredity or of dietetic or sexual excesses or other conditions, may lead to similar results.

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(2) Jour. Amer. Med. Ass'n., August 23, 1919.

[It is interesting to note that it is pathologic conditions in the ethmoid and especially the non-suppurative hypoplastic form of ethmoiditis that is responsible for most of the cases of severe sneezing attacks.—Ed.]

Hemolytic Streptococci in Nose and Throat. Cultures from the nose and throat in 567 persons were made on blood agar plates and studied by M. S. Tongs.[4] Of 100 cultures made from the throat, sixty-seven showed the presence of hemolytic streptococci; of the nasal cultures, only five in 100 examined gave positive results. Of the 100 individuals, thirty-nine were school children sent for examination by their schools, and thirty-two, or 80 per cent. of them, harbored hemolytic streptococci in their throats. Of sixty-one average individuals of this series, thirty-five, or 57 per cent., were found as carriers. Tong suggests that the higher percentage of carriers among schoolchildren so far examined is probably due to the tonsillar hypertrophy, as almost every schoolchild examined had large tonsils. One hundred and twenty-five pairs of excised tonsils were examined. Before each tonsillectomy, an ordinary throat culture was made and placed in 2 c.c. of plain broth. The tonsils, after removal, were placed in 25 per cent. silver nitrate for five minutes. The tonsillar capsule, if any, was removed by a sterile knife. One or two loopfuls of crypt contents were taken and placed in a broth tube. Blood-agar plates were made at once according to the shake method. The plates were studied after twenty-four hours' incubation and again later. Positive cultures were obtained from the tonsillar surface in seventy-four cases and positive crypt cultures were obtained in ninety-eight cases. Tong examined 342 persons to learn whether hemolytic streptococci are as frequently present in the nose and throat after tonsillectomy as before. Of this

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(4) Jour. Amer. Med. Ass'n., Oct. 4, 1919.

large number of tonsillectomized persons only seventeen throat cultures and ten nasal cultures showed hemolytic streptococci. In six cases positive cultures were obtained from both nose and throat. In five of the cases giving positive throat cultures, remnants of tonsils were found on careful examination; and it is also known that tonsillectomy had been done from three to five weeks before. In order to learn whether hemolytic streptococci may be present or absent regularly in throats with the tonsils removed, four tonsillectomized persons previously found to be carriers, and eleven also tonsillectomized persons known to be non-carriers, were selected for subsequent examinations. Hemolytic streptococci were never found in the throats of non-carriers, but always in carriers. In two cases hemolytic streptococci were found in successive examinations, owing probably to tonsillar remnants in throats.

[Experience has shown that persons who have been unusually susceptible to "head colds" generally experience a marked improvement after the removal of chronically infected tonsils. That is true even in cases in which the tonsils have not been the seat of recurring acute inflammation. The conclusion that the chronic infection in the tonsil is the focus from which the recurring head colds take their origin seems warranted.—Ed.]

Interpretation of Headache. The nose, as a source of head and face pains, is the subject of W. Wilson's[5] article. He is convinced that the harm perpetrated by over-specialism is as great as that caused by the intellectual sloth which is satisfied with a purgative or a sedative as rational treatment for a long-existing headache. He suggests a rational method of investigating a headache, which may or may not be due to a single causation. The time to treat a headache, which may be due to accommodative defect of the eye or to a nasal cause, which requires operation, is after the accommodation has been corrected by glasses for a short time. Wilson classifies headaches according to their cause as: auto-intoxicant; circulatory; extra-intoxicant; neurogenous; reflex; from local organic disease, and from variation in the tension of the cerebrospinal fluid. In

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(5) Practitioner, October, 1919.

investigating a case of headache he notes: (*a*) Whether unilateral or bilateral; (*b*) locality of pain; (*c*) any local tenderness, and whether superficial or deep; (*d*) whether constant, intermittent, or remittent; (*e*) diurnal incidence and variation; (*f*) character of the pain; (*g*) whether produced or aggravated by any position of body or by movement; (*h*) is there any complaint by the patient of any organ of the body, or is there any systemic fault—*e. g.*, anemia or other blood condition, pathologic condition of the urine (uric acid, albumin and sugar especially), dyspepsia, constipation, rheumatism, syphilis, or malarial history? The consideration of all these questions is taken up systematically by Wilson along the same lines as has been done by others.

[Headache dependent on disease of the nasal cavities has been greatly over-emphasized. The result has been a great deal of unnecessary operating on the nose for the cure of headache which is not due to nasal conditions. Suppurative disease of the accessory sinuses is responsible for most of the cases of headache of nasal origin. Anatomic variations are rarely if ever the cause of headache.—Ed.]

Rhinogenous Headache. According to E. Gallusser,[6] some long unsuspected nasal disease, which has never given any recognized subjective or objective signs of its existence, may entail headache for which no cause can be discovered. He describes a number of cases of this kind and warns of certain features that might suggest the clue. The headache is generally in the frontal region, a sense of oppression, a heavy feeling in the whole head, with occasional paroxysms of severe pain. The severe pain usually develops on arising in the morning (from change of position) and wears off later, but the severe headache may come on at any hour after sneezing, bending over or emotional stress. This is liable to give the pain a misleading neuralgic character. Another symptom is the pain on pressure of the internal angle of the eye, over the frontal sinus. The most violent pains also are sometimes promptly and completely relieved by cocaine to the upper interior of the nose. This immediate relief by cocaine calls for ex-

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(6) Cor.-Bl. f. schweiz. Aerzte, Nov. 20, 1919.

ploratory opening of the frontal sinus. One man of 48 had had headache on the right side daily for ten years, incapacitating him at times, but none of the numerous physicians consulted had ever detected any symptoms on the part of the nose. No treatment had given any relief and he had been exempted from military service on account of habitual headache. Tapping the right side of the skull and pressure on the roof of the right orbit were painful. The middle turbinate was unusually thick. To get a better view, Gallusser pushed this turbinate to one side, and the patient exclaimed at the relief this afforded. This encouraged high resection of the middle turbinate, opening of the frontal ethmoidal cells and exposure of the opening into the frontal sinus. Nothing pathologic could be detected, but the headache was cured once and for all. In another case long martyrdom from headache was cured by opening up the frontal sinus although nothing pathologic could be detected in it except that it was extremely sensitive to the probe. This woman of 44 tried to commit suicide on account of her headaches, which by exclusion had been long qualified as nervous. In neither of these two cases was any sign of suppuration found.

[The idea that headache may be caused by nonsuppurative conditions in the frontal sinus, that is by negative pressure from obstruction of the naso-frontal duct, is an old one. Our experience has led us to doubt this conclusion. When the intranasal examination and the *x*-ray fail to disclose evidence of frontal sinus disease one should be very slow to resort to operative treatment.—Ed.]

Headaches from Sinus Troubles. Seven cases typical of various sinus troubles are reported by C. C. Albright.[7] In nearly all of these cases of headaches, due to use of the eyes, Albright says, the frontal sinus opening is partially closed, and a tender point under the floor of the frontal sinus can be found. He is convinced that most cases of so-called migraine, the cause of which has been hard to determine, and also a great many obscure eye troubles, are caused by accessory sinus disorders, and can be relieved by proper intranasal treatment.

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(7) Journal-Lancet, Sept. 15, 1919.

Treatment of Sepsis in Nose and Ear by Ionization. The zinc ion used by A. R. Friel[8] is introduced into the tissues from a solution of a zinc salt at the positive electrode. The ion coagulates or "fixes" albuminous substances, whether tissue cells or bacteria. Coagulation of cells or of bacteria involves their death. The ion can be made to penetrate the tissues to any depth required.

A suitable solution to use is: Zinc sulphate, 5 grams; glycerine, 57 c.c.; water to 1,000 c.c. To be diluted with an equal quantity of hot water at the time of using.

To regulate the current the most convenient and effective means is Leduc's water rheostat. The cavity to be ionized is first washed free of all pus by the solution. A Siegel's pneumatic speculum is of much help in aspirating discharge, and in introducing the zinc solution into the recesses of the middle ear. The details of the method are: The cavity—middle ear, maxillary antrum, sphenoidal sinus, etc.—is filled with the solution. The wire conveying the current is dipped into it. To prevent the wire coming into actual contact with the tissues it is placed, in the case of the ear, inside a vulcanite speculum. In the case of the nasal sinuses, the metal tube which conveys the fluid to the sinuses is utilized to convey the current also, but is covered on the outside by rubber tubing or by several coats of insulating varnish. It is desirable to block up the posterior nares for two reasons: first, to prevent the patient swallowing the sulphate of zinc; and secondly, to ensure that the nasal sinus is kept full of the fluid. This can be done by introducing into the posterior nares, in an empty condition, a small rubber balloon, made of a finger stall and then inflating it.

Approximate dosage is as follows:

Middle ear	3 M A	6 minutes
Maxillary antrum	15 M A	10 minutes
Frontal sinus	10 M A	10 minutes
Sphenoidal sinus	7 M A	10 minutes

A condition essential for success is that the ionizing fluid be in contact with the whole of the affected area. If there is no area of caries or necrotic bone, as evidenced by granulations, and no polypi are present, one ionization should cause cessation of suppuration in a chronic case within twenty-four hours.

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(8) Practitioner, December, 1919.

DISEASES OF THE NOSE.

Application of Pure Cocaine for Nasal Anesthesia. The use of pure powdered or flake cocaine is compared by A. H. Andrews[1] with the cocaine solutions ordinarily employed.

[This method of securing local anesthesia seems quite logical and recommends itself especially because of the small amount of cocaine required. It is interesting in this connection to note that use of the weaker cocaine solution—a 5 per cent. solution in most cases—gives as satisfactory results as does the 20 per cent. solution. —Ed.]

The method he has adopted is as follows: First, apply to the part to be anesthetized pencils of cotton saturated with one to five thousand solution of adrenalin. These pencils should be left in position five to eight minutes. After their removal, a small pledget of cotton is wound on an applicator and dipped in water or adrenalin solution. The excess of fluid is removed from the pledget by touching it to a towel. The damp pledget is then dipped into the powdered or flake cocaine and a small amount of the cocaine is rubbed gently over the desired area. Removal of the excess of fluid from the pledget is important, for if the pledget is too wet the fluid will run off into the remaining dry cocaine and cause it to crystallize. If profound anesthesia is to be produced a second application can be made after two or three minutes. Ordinarily the anesthesia is sufficient for examination or operation to be commenced immediately after the second application.

The advantages claimed for the method are:

1. It is safer than cocaine solutions. The contracting effect of the cocaine powder upon the blood-vessels seems to prevent its absorption. In several thousand anesthesias produced by this method Andrews has yet to see a case of appreciable constitutional disturbance.

2. The anesthesia is more prompt, more profound, and more lasting. If carefully applied the ordinary operations become painless. The one notable exception is that of opening the antrum of Highmore. Cocaine applied to the nasal side of the antral wall does not anesthetize the antral mucous membrane.

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(1) Illinois Med. Jour., January, 1920.

3. The small amount of cocaine required is advantageous both from the standpoint of safety and economy. From ¼ to ½ grain of flake cocaine is sufficient to anesthetize both sides of the septom for a submucous resection. If strong solutions and saturated pencils are used, several grains will be required.

Nerve Blocking for Nasal Surgery. A description of nerve blocking by procaine, as used in twenty-nine nasal operations, with complete anesthesia in all except two cases is given by R. G. Reaves.[2] The injection of the nasal nerve is a very easy procedure. The injection of Meckel's ganglion is a little more difficult, as one has to locate the canal, but usually this is not hard to do.

For the nasal nerve instil a few drops of 4 per cent. cocaine into the conjunctival sac to prevent pain on inserting the needle. Lift the upper lid upward and inward by placing the thumb at the inner and upper margin of the orbit and direct the patient to look outward. Insert the needle through the plica semilunaris just below the upper lachrymal puncta, directing it slightly inward and upward, at an angle of about 30 degrees. The needle will soon strike the os planum, and on moving the point of the needle up and down, when inserted about 2 cm. (¾ inch) in depth; it will engage in a groove the anterior end of which terminates in the anterior ethmoidal foramen. Here the nasal nerve leaves the orbit. Inject about 1 c.c. of 1 per cent. solution of procaine.

Meckel's ganglion.—Brush the hard palate with a solution of cocaine along the root of the molars. Place the index finger on the hamular process of the internal pterygoid plate and bring it forward until a depression, the lower end of the posterior palatine canal, is palpated. Place the needle at an angle of about 45 degrees with the upper teeth and along the second molar about ⅛ inch from its root. This brings the needle near the canal, which it usually enters after three or four attempts. Pass the needle upward about 2.75 to 3.5 cm. (1 to 1¼ inches), when the point will be near Meckel's ganglion. Inject from 1 to 1.5 c.c. of 1 per cent. solution of procaine.

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(2) Jour. Amer. Med. Ass'n., May 29, 1920.

[Injection of cocaine is always a dangerous procedure as evidenced by a larger number of fatal cases. Where injection is to be resorted to it is much better to use novocaine.—Ed.]

Mal-Eruption into Nose of Lateral Deciduous Incisor. Shooting neuralgic pains over and about the left eye, always associated with occlusion of the left nostril was the symptom complained of by V. B. Fischer's[3] patient. Examination of the nose revealed a septum badly deflected, crumpled and spurred in contact on the left with the middle and inferior turbinate. The membrane was red and dry. The right nose was patent, but devoid of secretion. The inferior turbinate was hypertrophic and the septum was concave. Under cocaine and adrenalin ischemia, the middle turbinate area on both sides was visible, but revealed no evidence of trouble, secretion, polyp or hypertrophy. Endoscopic examination evidenced no abnormalities on the right side, but in the left naris the instrument could only be inserted for a short distance above the inferior turbinate and spur. Family and personal history was negative. A complete submucous resection was done. With the crest off, the mucous flap refused to be retracted lateralward, and the retracting instrument encountered a bony hard resistance along the floor of the nose through the mucous flap. Cutting and biting instruments refused to take hold. A tentative diagnosis of malerupted tooth or exotosis was confirmed by Roentgen-ray examination (Fig. 28).

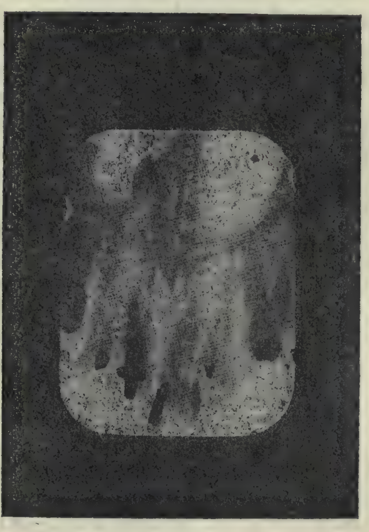

Fig. 28.

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(3) Ann. Otol. Rhinol. and Laryngol., December, 1919.

Correction of Crooked Nose. E. W. DeFlines[4] gives illustrations before and after his correction of "rhinodystasis," congenital or acquired and describes his technique for this "rhinorthosis" by cutting a wedge-shaped piece, out of the upper jaw, on the broader side of the nose, working through the nose and subcutaneously, so there is no scar. The apex of the triangular wedge resected points upward, reaching nearly to the orbit. The bone on the other side is reached in the same way but merely a linear incision is made on this side, slanting from the orbit outward and the same length as the corresponding side of the wedge on the other side. The nose is then pushed over into its normal place. In doing this, the bony connection with the frontal bone has to be wrenched apart or fractured. He does this with the thumbs both on the small side, and has always succeeded without using instruments. The nose is then modeled, and fastened in its new position with a stout silk thread passed through a hole in the jaw on the broad side and in and out through two holes in the septum, thus pulling the whole nose over into its proper place. He operates under local anesthesia throughout, as also when he merely removes redundant bone to transform any ugly hook nose into an esthetic profile.

Humped, Hooked and Bulbous Noses. The only effective treatment for this deformity, says W. W. Carter,[5] is operative. This is extremely satisfactory. No scar is left, as all the work is done from within the nose. The strength of the nose is not impaired. In many instances it is necessary to shorten the tip and reduce the bulbous extremity of the nose. The entire operation, as a rule, is done at one sitting, and either local or general anesthesia may be employed. Carter has found no difficulty in doing the operation under novocaine and adrenalin, if a small dose of morphine and atropine be administered beforehand. After the proper antiseptic precautions have been observed, an incision is made through the mucous membrane of the roof of the left nasal cavity at a point corresponding to the interval between the upper and lower lateral cartilages. The spatula

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(4) Nederl. Tijdschr. v. Geneesk. Nov. 1, 1919.
(5) Med. Record, May 22, 1920.

knife is then introduced and the tissues of the nose are elevated over the entire dorsum, care being taken to keep under the periosteum over the nasal bones. The saw is then introduced and the entire hump sawn off. The upper edge of the septum is removed; the lateral walls of the nose can then be approximated at the apex by bending them inward by means of the Adams' forceps. This produces the rounded apex to the dorsum of the nose. There still remain, however, numerous little irregularities which must be smoothed down with the rasp.

For noses having very pronounced humps and broad, massive bases, a high submucous operation on the septum should first be done. This should not include the upper edge of the septum which forms the keystone of the nasal arch.

The tissues over the sides of the nose are then elevated, and a wedge-shaped piece is removed from either nasal process of the superior maxilla. The dorsum of the nose is then forced down by means of the Adams' forceps, thus reducing the deformity.

When the nose is too long, it is shortened by removing a fan-shaped piece from the septum and pushing the tip of the nose up and sewing it in position. This last operation is done after the dorsal deformity has been corrected. After all of the blood and detritus have been removed from the sacs made by this extensive submucous and subcutaneous dissection, the nasal cavities are lightly packed with sterile vaseline gauze, and a well-fitting and properly padded copper splint is applied; this splint remains on, as a rule, for four or five days or until healing is completed. Carter has operated in about fifty cases and the results, he says, have been most satisfactory.

Operation for Rhinophyma. J. F. Grattan[6] reports a case of fifteen years' duration, following a severe laceration by a dog bite, in which a normal sized nose was secured by operation.

A U-shaped flap was made above, beginning at each ala and including about one-half inch of the skin on the superior surface of the tumor mass. An inverted U-shaped flap was made on the inferior surface of the nose,

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(6) Jour. Amer. Med. Ass'n., May 22, 1919.

including the skin of the entire inferior surface of the tumor. The ends of the two U-shaped incisions were made to meet at each alar crease. The flaps thus outlined were dissected off the tumor with considerable difficulty, both because of the leathery quality of the skin itself and because of its firm attachment, or rather inclusion in the tumor. The skin flaps having been freed, the tumor was dissected in a wedge-shaped manner from the underlying nasal cartilage. There was considerable fibrous tissue in the tumor and no distinct differentiation between the tumor and nasal structure. The dissection was rather difficult on account of these conditions. Considerable bleeding of both arterial and venous character was encountered. This was controlled by suture-ligatures of fine catgut. The inferior flap proved one-fourth inch too large and was trimmed to fit the upper flap. The lower flap was rolled up over the edge of the nose so that the suture line ran directly across the anterior surface of the nose from ala to ala. The upper flap was very difficult to adapt to the new contour, as it had stood out at a right angle to the anterior nasal line during the long period that it had performed the function of covering the upper surface of the tumor. The adaptation was begun by fastening it at its center to the center of the lower flap and then adapting the sides by trimming and scoring the edge, fitting and refitting several times, until the best possible approximation was obtained. In this way a rather well-shaped nose was molded out of very discouraging material. Interrupted sutures of fine silk were used. These were removed on the fourth day. The tension was relieved by sterile adhesive straps.

The wound healed by primary union and the patient left the hospital on the tenth day. Aside from slight redness and the prominence of the sebaceous gland orifices, the nose had the appearance of a normal organ. Trichloracetic acid was applied periodically, until the higher prominences of the skin were leveled. This treatment was repeated until all areas of the nose had been smoothed out, and the result is most satisfactory. Four applications were made in all. Subsequently, exposures of the Roentgen-ray at three-week intervals were given with the idea of further improving the condition of the skin and keeping in abeyance any tendency to recurrence of growth in the tissues treated.

The nose before and after operation is shown in Plates XIII and XIV.

Nasal Prophylaxis. A method that J. P. McCann[7] found very satisfactory in caring for the nose, both as a prophylactic and remedial measure, is to instill about 5 drops of a 20 per cent. solution of argyrol into either side of the nose. This is put in with a medicine dropper with the patient lying on the back. Used in this way, there is no danger of forcing anything into the Eustachian tubes on account of the small amount used and the absolute lack of force. This method also has the advantage of not producing mechanical irritation. The argyrol spreads over the greater part of the nasal membrane, especially the mouth of the Eustachian tubes. In connection with this, a spray of medicated oil is used. Menthol, gum camphor and alboline or some similar combination is probably the best. In acute stages the amount of the menthol and camphor used in the alboline must be very small or this will prove irritating. After the more acute stage is past, the strength of the menthol and camphor may be increased with benefit. McCann has found that this procedure will in most instances enable the patient, by gentle clearing, to keep the nose clean and as nearly aseptic as is possible but should not be used as a routine practice. The argyrol solution used on a cotton applicator is preferable when the argyrol used with the dropper is not sufficient.

Case of Sarcoma of Nose. The patient whose case is reported by S. G. Higgins[8] first showed nasal obstruction and what looked like nasal polyps. Although the boy was then only 5 years old, the polyps were removed in May. The growth recurred, and August 10, the child was referred to Higgins. Examination within the nares showed the left side closed by the total deviation of the septum to the left. The right side was completely obstructed by what looked like firm though shining polypi. These appeared to be all from one mass, watery gray surface but on a hard dark red background. Very little

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(7) Jour. Mo. State Med. Ass'n., December, 1919.
(8) Wisconsin Med. Jour., May, 1919.

manipulation was possible. A snare of this tissue was reported from the laboratory to be sarcomatous. Roentgenograms of the face showed the entire sinus area of the right side including the antrum deeply dull and the left nasal space dark but with some lighter area at the outer limits of the left antrum. The child was operated on August 17 under ether narcosis; the incision was made along the lower border of the right orbit from a point near the center of the orbit extending near the upper curve of the nose, then down the line at the border of the cheek and nose around the curve of the external nares down and up into the right nares. The cut severed all tissue to the bone with the flap including the periostum. The anterior face of the right antrum was chiseled open with the bony wall removed extending to the floor of the nose and limits of the orbit above. The growth was found to be of firm consistency, dark red in color with a glistening surface and filled the antrum completely, in fact, pushing the walls in all directions. The most marked crowding effect was on the septum which had been laterally crowded into the left nasal chamber. This crowding over of the septum accounted for the Roentgen-ray shadow of the left cheek and antrum. All of the ethmoidal labyrinth, upper turbinal bones and the inferior turbinate were removed with the growth. The growth had not denuded nor become a part of the septum wall. The postoperative recovery was uneventful.

[Our experience with genuine sarcoma involving the nasal cavities has been that there is a rapid postoperative return of the growth. A gumma has not infrequently been diagnosed as a round-cell sarcoma.—Ed.]

Nasal Obstruction Due to Abnormal Action of Nasal Mucosa. Nasal obstruction due to faulty action of the mucous membranes covering the septum and turbinates is, in the opinion of M. S. Ittelson,[9] responsible for many cases of defective nasal breathing, common colds and catarrh, and perhaps for other less frequent and more annoying conditions, such as vasomotor rhinitis or hay fever. An important subjective symptom of this type of obstruction is that it is not fixed or constant, but occurs irregularly and disappears as irregularly as it comes,

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(9) N. Y. Med. Jour., Jan. 3, 1920.

without apparent reason. The obstruction may occur in both nostrils, more often it alternates from one side to the other, and here too the patient experiences a sudden change from opening to closure, from no apparent cause. Inspection of the nose may reveal nothing abnormal, or the mucous membrane may have undergone fibroid changes, or the turbinates and the mucous membrane covering them are hypertrophied. This hypertrophy is a secondary and probably a conservative process on the part of Nature to make up this deficiency of normal function. In view of the difficulty of determining the cause of this nasal priapism, the treatment is naturally not satisfactory. Outside of snaring off an enlarged posterior tip, nasal obstruction is the least important indication for operation on the turbinates. Even if other conditions require surgical interference, an effort is now made to preserve this mucous membrane. To judge fairly the results of operation, it is well to note that many of these patients are extremely susceptible to mental suggestion. An intranasal operation often acts as a surgical placebo. Local applications of argyrol or silver nitrate, as well as douching and irrigation with saline or mild antiseptics, occasionally relieve this condition. In some, an oily preparation or a 10 per cent. ichthyol ointment works best.

The general treatment is really more important. Many patients are neurasthenics or suffer from constipation or like disorders. Many require the correction of faulty hygiene or a change in diet and climate. Vaccines and glandular therapy might be tried. Often it is best to tell the patient that this condition is not dangerous or important and it is best to leave it alone, a conclusion they themselves arrive at after repeated visits to different rhinologists.

[The nasal condition here discussed we have found one of the most troublesome and one of the most difficult to treat. We concur in the view expressed by Ittelson that a general condition more than a purely local one is at fault. The process resembles an anaphylactic reaction.—Ed.]

Nasopharyngeal Secretions from Influenza Patients. An experimental study of the nasopharyngeal secretions from influenza patients was made by P. K. Olitsky and F. L. Gates[1] during the course of one and a half years in three successive periods: the epidemic wave of 1918-1919, when actual cases of acute uncomplicated influenza and persons who had never been affected were studied; the late autumn of 1919, during which influenza did not prevail in New York in epidemic form, when healthy controls were studied; during the winter of 1920, when there was a return of the epidemic. The materials with which the authors worked were the saline washings from the nose and throat secured from eight cases of influenza within the first thirty-six hours of the disease, and from twelve cases at later stages, namely, either during convalescence or the period of the post-influenzal pneumonia. In addition, fourteen persons, during the epidemic or interepidemic periods, believed never to have had influenza were washed in the same manner and their washings studied. Full grown rabbits were used for inoculation. The inoculations were made directly into the lungs by means of the intratracheal catheter; 3 c.c. of material was the usual dose for a 2.5 to 3 kilogram rabbit, and consisted of (*a*) the unfiltered nasopharyngeal washings, (*b*) the filtered washings, (*c*) lung tissue suspensions, filtered and unfiltered, from previously inoculated rabbits, and (*d*) similar lung tissue preserved in sterile 50 per cent. glycerine. From the evidence obtained in this study it would appear that there occurs a specific substance in the nasopharyngeal secretions in cases of epidemic uncomplicated influenza. This substance seems to be present only in the early hours of the disease. It has not been found later than thirty-six hours after the onset, nor in cases of secondary pneumonia, nor in secretions from persons free from the syndrome of influenza either during the epidemic or during non-epidemic periods.

With this substance the authors have induced a clinical and pathologic condition in rabbits, affecting the blood and pulmonary structures mainly, which could be maintained and carried through at least fifteen successive animals. For this reason, and also because of the

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(1) **Jour. Amer. Med. Ass'n., May 29, 1920.**

dilution between passages and the shortening of the incubation period from rabbit to rabbit, they are led to believe that they are dealing with the actual transmission of a multiplying agent rather than with a passive transference of any original active substance. This active substance is filtrable, and resists the action of sterile 50 per cent. glycerine for nine months, but probably not for a much longer period. The manner in which the bacteria of ordinary species, such as the pneumococcus, the Pfeiffer bacillus, *Streptococcus viridans* and others are encountered during the course of the transmission experiments and during the experimental reproduction of the condition described justifies the opinion that these microörganisms are secondary in effect. The essential effects are produced by a substance wholly unrelated to these bacteria.

During the course of these experiments cultures were obtained, both from the lung tissue of affected rabbits and in the filtered nasopharyngeal washings from cases of influenza, containing tiny bodies, almost invisible, which decolorize by Gram's method, and which stain generally with difficulty with nuclear dyes.

Nasal Hydrorrhea. The characteristic symptoms of nasal hydrorrhea, as noted by J. A. Thompson,[2] are a sense of extreme irritation in the nose, followed by sneezing and a very profuse watery discharge from both nostrils. The discharge varies in amount from an ounce to a half pint in twenty-four hours. The fluid is alkaline and contains small amounts of sodium chloride and traces of phosphates. The presence of mucin differentiates it from the cerebrospinal fluid discharged from the nose after injuries.

In some patients, the discharge persists throughout the day. In others it is periodical, flowing for hours and then ceasing until the next day. Cold winds, dampness and dust aggravate the symptoms. After some months of this annoying flow, polypi appear. Their removal has only a mechanical effect in opening the nostril, as the other symptoms are not modified. They soon recur.

A direct examination of the nose reveals that the

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(2) Jour. Amer. Med. Ass'n., August 23, 1919.

mucosa is pale bluish, sometimes translucent. The swollen turbinates entirely fill the nasal cavity. Persistent rubbing with cotton pledgets soaked with an epinephrine and cocaine solution will sometimes enable one to shrink the tissues temporarily until it can be seen that no hypertrophy is present. Usually the entire length of the turbinated body is affected. In some cases the anterior portion, in others the posterior portion is more edematous. The disease may begin at any season of the year, and last for months or years. One reason for the opinion that the disease is nervous in its origin and that the nasal symptoms are significant only of lesions in the nerve centers is the marked mental depression, amounting almost to melancholia, from which these patients suffer. Another reason suggested by Thompson is that any unusual mental or emotional strain greatly aggravates the nasal symptoms. A final reason for the belief in the essentially nervous origin of the disease is the absolute failure of local treatment to give relief, and the success of tonic and hygienic measures. There is no evidence to show that the disease is one of anaphylaxis, or one due to disorders of the endocrine glands. In the mild cases, sprays of epinephrine solution, one part of epinephrine to 7,000 of saturated solution of boric acid, have sometimes given relief. In the severer cases, the epinephrine preparations do not secure even temporary contraction of the vessels in the turbinated bodies. Cocaine must be applied only by the physician himself, and with extreme caution. The patient's mental condition is such that he will use anything to open the occluded nostrils and check the discharge, and the drug habit is quickly formed. A spray solution that has given a remarkably prompt relief in acute inflammation of the nose would seem to be useful in nasal hydrorrhea. The formula* is given herewith:

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* As this solution is one the druggist can not make without special instructions, the method of dissolving the epinephrine in oil is given. Triturate the menthol, camphor, epinephrine and atropine (alkaloid) in a mortar until they liquefy. Continue trituration for some time after liquefaction "until the mortar rings." Add the mixed oil of sweet almonds and liquid petrolatum very slowly, with constant stirring. Bottle and let stand for twenty-four hours with occasional shaking. Filter through a dry funnel into a dry bottle, and the preparation is ready for use.

Atropine (alkaloid)	gr. ss
Epinephrine	gr. i
Menthol	gtt. xxiv
Camphor	gtt. xii
Oil of sweet almond	flz ii
Liquid petrolatum	fl℥ vi

Mix and dissolve.

Operative measures, except for the removal of polypi, should be used with extreme caution. As most of these patients are women or men of sedentary habits, active exercise in the open air is the first essential treatment. If this exercise is vigorous enough to produce free perspiration, the result will be much better.

The exercise should be followed by a hot, cleansing shower bath, ending with a cold shower down the spine. In some very delicate women, massage must be given for a time to tone up the flabby muscles so that exercise can be taken. The bowels and kidneys must be kept active with salines and natural aperient waters. If the open air exercise is taken, the appetite and nutrition will be restored without medication. Nerve tonics help in the early cases.

Bacteriology of Chronic Nasal Catarrh; Treatment by Autogenous Vaccines. The cases on which L. Mackey[3] reports were patients suffering from (1) recurrent acute nasal catarrh, (2) chronic nasal catarrh, or (3) chronic post-nasal catarrh. In catarrh almost invariably a profuse growth is obtained of the causative germ, which is usually *Pneumococcus, B. influenzae, Micrococcus catarrhalis,* Friedländer's bacillus *(B. mucosus capsulatus),* or a special type of streptococcus.

Mackey maintains that the person who carries pneumococci or influenza bacilli in his nasal cavities is not really healthy though under ordinary circumstances he may appear so. He is capable of infecting others. In times of stress and unusual effort, and on exposure to "fugs" and chills his infection finds him out. The man who gets lumbago after gardening, stiffness after tennis, sciatica after sitting on the grass, neuritis from starting his car, and a cold in the head after a long dusty ride is not necessarily "gouty;" he may be simply infected. The pains and disorders which accompany all acute infections show what germs and their toxins can do, and in a mild degree chronic infections produce similar symptoms. Mackey has treated over 500 cases of chronic catarrh with autogenous vaccines. The patients were sent by their physicians because ordinary measures had failed to cure them. In children vaccines were seldom used; chronic catarrh in children is due to adenoids, and can be cured by the surgeon.

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(3) British Med. Jour., Aug. 9, 1919.

The vaccines were made from the germ or germs which Mackey believed to be responsible, and always from the primary cultures when these were pure. Mixed vaccines were made when two or more catarrhal germs grew profusely on the plates, or when, as sometimes happened, a different infection was found in the two nasal passages.

The vaccine most frequently used was pneumococcus, either pure or combined with some other germ, and the next on the list was Pfeiffer's influenza bacillus; and then *Micrococcus catarrhalis, Staphylococcus aureus, Streptococcus mucosus, B. mucosus capsulatus* (Friedländer's), and, last of all, *B. septus* and *B. coryzae segmentosus.* The vaccines were made in such strengths that 20 minims represented the maximum dose, and he began with 4 or 5 minims and gradually increased, giving twelve doses at intervals of a week. The maximum dose of pneumococcus and streptococcus used was always 150 million for an adult, and of the other germs 300 or 400 million.

The results are good; they have been better in the last three years than they were in the first three, simply because Mackey thinks he is better able to judge what germs to use in the case of mixed cultures, and because in doubtful cases he insists on repeating the test before he prepares the vaccine. In some instances the vaccine has failed completely, but such cases are fortunately rare.

Mechanical Treatment of Nose-Bleed. In the opinion of D. T. Atkinson[4] the first thing indicated in the majority of cases is the application of pressure to the bleeding surfaces, by means of pledgets, of gauze or absorbent cotton, with or without astringent solutions. The bleed-

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(4) New Orleans Med. and Surg. Jour., September, 1919.

ing surface should be sought for, if possible. That is a very easy matter in the doctor's office, but in emergencies it is usually impossible to locate a spurting vessel because of the lack of facilities for making examinations. In such cases, pledgets of cotton saturated in a styptic, preferably adrenalin chloride, may be pushed up into the nares at random, with the hope that the point of bleeding may be covered and the hemorrhage stopped. Pieces of string should be fastened to the plugs to facilitate their removal.

Where a good light can be had and, with the head-mirror and nasal speculum at command, the simplest and most efficacious method of controlling nose-bleed lies in the gauze tampon. The gauze strips should be about an inch in width. In emergencies a narrow gauze bandage may be used. A ball of gauze is carried, with forceps, high up to the roof of the nose, and is pressed into position between the middle turbinate and the septum.

The gauze is fed into the nares in a zigzag manner, extending from the roof to the floor of the nasal cavity, until the anterior nares is reached. The slip is then cut off and the end tucked into the nostril. For the styptic effect, the gauze may be soaked in adrenalin chloride or solution of tannic acid or other astringents. This method has the advantage of bringing the gauze in contact with the whole mucous surface of the nose. The gauze fills with clotted blood, thus equalizing the pressure, and the bleeding point is usually reached and the hemorrhage controlled.

[The ordinary case of nose bleeding is due to the dilated vessels on the anterior part of the septum and is effectively checked by cauterizing those vessels. The troublesome cases are those in which the bleeding occurs deep in the nose and in which this is complicated by an irregular septum. The checking of the bleeding may be a very difficult procedure. We concur in the view that pressure by means of gauze strips is the best method. —Ed.]

Douching the Nose in Children. Assuming that douching is indicated in any given case, how shall it be done in a child, so that good instead of harm may result? A technique for nasal douching that, in the opinion of W. A. Hitschler,[5] reasonably meets the requirements is as follows: Both nasal fossae should be as free and as open as possible, so that the return flow of liquid be not impeded, to avoid carrying infection to the middle ears. Inspection of the nasal fossae under good illumination is necessary. Patients requiring douching rarely have the fossae open; but, open or not, contraction of the mucosa, especially the cavernous tissue of the turbinates, is indicated. This is accomplished by dropping a solution of adrenalin chloride (1:2,000 or 1:4,000), or some similar suprarenal preparation, in each nasal fossa. An ordinary medicine dropper makes a good apparatus. The tip should be perfectly smooth so that it will not scratch the mucosa in case of accidental contact, and it should be of generous caliber. In order that the adrenalin may reach the upper as well as the lower portions of the nasal fossae, the child's head should be well extended, preferably while in the supine position on a bed, couch, or an attendant's lap. After a few minutes interval, during which the child may be allowed to resume the sitting posture, the instillation should be repeated until inspection demonstrates that the turbinates are well contracted. Ordinarily, it is wise not to use cocaine in children for the purpose of contracting the mucosa.

With the turbinates contracted, the child should occupy the sitting posture and bend the head forward and downward until it almost faces the floor. This is to allow gravity to assist the egress of the washing solution. A soft rubber nasal douche, of a capacity of a half an ounce or less, may be filled with the washing solution and introduced into the nasal vestibule. A solution consisting of equal parts of normal saline and saturated boric acid solution is the best. The solution should be comfortably warm. The ordinary soft rubber ear syringe with the long tip is objectionable in that it may penetrate too far into the fossa. The pear-shaped douche with the short, blunt, conical tip, too wide to pass the vestibule, is a safer apparatus. The douche should be used with gentleness, and the stream directed along the floor of the fossae as well as the upper portion. A douching apparatus of a larger capacity than half an

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(5) N. Y. Med. Jour., May 31, 1919.

ounce is objectionable for the reason that a flow lasting more than a few seconds is likely to cause middle-ear involvement, for the little patient may involuntary perform the act of swallowing and so permit the solution to enter the middle ears, possibly carrying infection with it. Deglutition may be delayed or prevented by having the child keep the mouth open. In children under 7 years of age, there are ordinarily no organic obstructions in the nasal fossa to interfere with the flow of liquid. Whatever obstruction exists is usually due to adenoids, functional swelling of the turbinates, or to secretion. In older children, however, a septal deformity alone may cause one fossa to be less free than the other, even after contraction of the mucosa. At any rate—and this is the important point—unless both sides are reasonably patulous, the solution should be introduced into the less open fossa of the two. Failure to observe this precaution has often resulted in an acute otitis media. With both sides sufficiently open, however, no such precaution is necessary. Ordinarily, from 2 to 4 ounces is a sufficient quantity of solution to cleanse the nasal fossae. Inspection under good illumination is in order, and if discharge still is present, the douching may be repeated. Unfortunately, with the means at our disposal including even the use of the postnasal mirror and the pharyngoscope, we are unable to ascertain if the nasal mucosa is completely cleansed; and in any event, the use of the postnasal mirror and the pharyngoscope is not practicable in a young child. Anterior inspection must then suffice; but we may gain additional information by having the child inhale and exhale rapidly through the nose, making note of the sound. Between the several douchings and afterward, the child, if old enough, should be instructed to blow the nose—both sides simultaneously. The common practice of closing one side of the nose while blowing the other is permissible under certain circumstances, but ordinarily it is to be avoided; the side held closed is usually the open side, and should the forcibly expired air be prevented from having easy passageway through the remaining nostril, infection might be carried to the middle ear; or, if it is to be denied that infection may thus take place, at least an acute otitis media may be precipitated. Whatever other medication deemed necessary is instituted.

[Nasal douching, especially in children, carries with it grave risk of carrying infection into the middle ear. —Ed.]

Nasal or Sphenopalatine Neurosis. The neuralgic syndrome, which is discussed by H. L. Pollock,[6] consists of pain, intense and excruciating in character (in some, cases of milder variety), radiating to any and all points supplied by the branches of the ganglion. The typical location of the pain is over the root of the nose, in and about the eyes, over the frontal region, into the pharynx and tonsil region, in and around the ear, posterior to the mastoid, into the occiput, to the neck, shoulder, the arm and, at times, even to the fingers. The most severe and constant pain seems to concentrate at a point about 6 mm. back of the mastoid. Not all patients present this typical picture, as usually only one or more of the parts named are involved; but Pollock has seen a few cases in which all of them were affected at the same time. In practically all of these cases, the pain just posterior to the tip of the mastoid is present.

When a patient presents this clinical picture, the diagnosis is simple. All local points of irritation or inflammation must be searched for and corrected before an attempt is made to attack the ganglion itself. The prognosis of these neuroses is always bad if left alone. When proper treatment has been resorted to, the prognosis is naturally improved. One of the most valuable prognostic points is the application of from 20 to 90 per cent. cocaine solution in the region of the sphenopalatine foramen. If this stops or ameliorates the pain to a great degree we can be reasonably positive that the injection of the ganglion will give good results.

The technique is simple: Anesthetize the posterior end of the middle turbinate and the wall just behind it, with a 20 per cent. solution of cocaine. Then a sword needle of Sluder is employed, a straight needle 5¼ inches long with a cross bar near the end. The needle is introduced from the septal side of the nose. Pollock transfixes the posterior end of the middle turbinate and presses the needle gently through the turbinate until the

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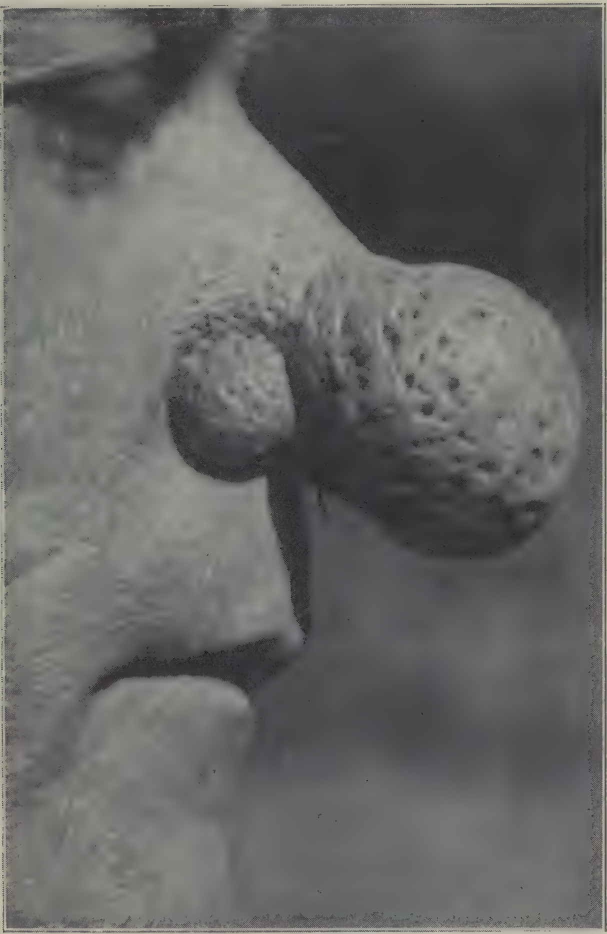
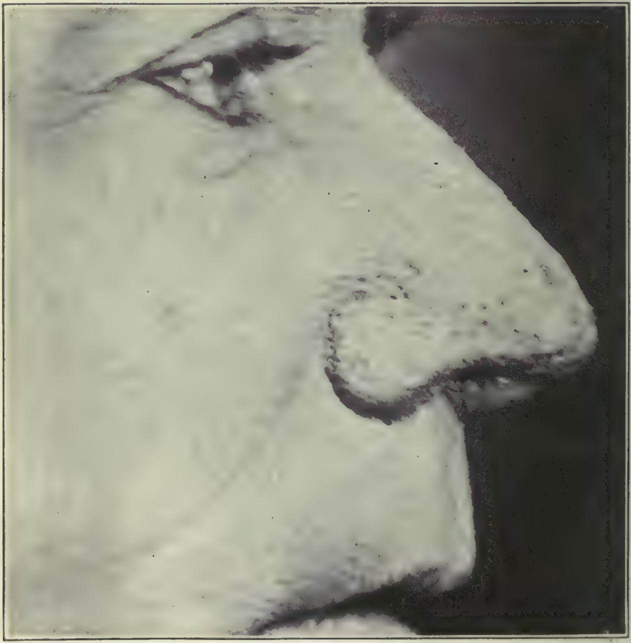
(6) Jour. Amer. Med. Ass'n., August 23, 1919.

PLATE XIII.



A. Before operation.—Grattan, page 275.

PLATE XIV.



B. After operation.—Grattan, page 275.

posterior wall is felt. The needle is then pushed upward, outward and backward through the bony wall which is the anterior boundary of the sphenomaxillary fossa, in which the ganglion lies surrounded by connective tissue. Usually, by tactile sense, one feels the needle slip into the cavity. The ganglion is about 0.66 cm. back of the wall. A 5 c.c. Lüer syringe, filled with a 2 per cent. solution of phenol (carbolic acid) in alcohol is then attached to the needle, and from 5 to 15 minims are injected. If the needle succeeds in penetrating the ganglion, the patient complains of excruciating pain in the eye, ear, top and back of the head and in the shoulder, but should the phenol alcohol solution merely surround the ganglion, the pain will be less severe.

The pain usually lasts anywhere from a few minutes to twenty-four or forty-eight hours, and it is in cases in which the pain is prolonged after injection that the end-results to the patient are most gratifying. The number of injections necessary is variable. If the ganglion is penetrated the first time, as indicated by the severe pain, only one injection is required. If not, two, three or four attempts may be made at intervals varying from a few days to several weeks. If no relief is obtained after four such injections, further attempts would be useless.

New Head Lamp. Gilbert Chubb,[7] assistant surgeon at the Throat Hospital, Golden Square, has devised a head lamp on the well-known Klar principle, but with a reflector of speculum metal, so that it can not break, and of sufficiently small size to allow of very useful peripheral vision when in place (Fig. 29). The eyeholes are very large and placed on the converging lines for near binocular vision. The reflector is attached to a rigid head-band by an arm with an adjustable hinge at either end, per-

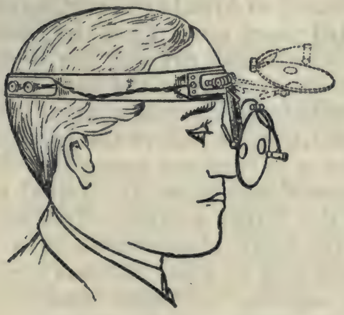


Fig. 29. New head lamp.

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[7] Brit. Med. Jour., April 3, 1920.

mitting of movement only in the sagittal plane. The lamp can thus be adjusted before washing up, and then brought down into place, or pushed away from the face, with a mop. An automatic switch cuts off the current when the reflector is out of use, thus enabling it to be used off a pocket battery without waste. The front part of the head-band is sloped back through 15 degrees, so that it lies flat on the forehead, and permits of the lamp being worn for long periods without discomfort. Chubb has found the lamp useful not only for ear, nose, and throat work, but also for many operations in general surgery where the general illumination available was insufficient.

Submucous Resection Operation. M. Lubman[8] is of the opinion that too many septums are sacrificed because they are not straight. A deflected septum *per se* does not require any operative intervention so long as the patient does not complain or show symptoms of obstructed breathing and drainage.

A deflected septum dates back to childhood. This is important to remember.

The patient has had his deflected septum a number of years, still his complaints date back only to the last year or so, that is indication enough that the present symptoms of the patient are not due to the deflected septum, but to the pathologic condition of the other structures in the nose caused by the deflected septum. In other words, his complaints are due to the pathologic state of the turbinates. The deflected septum which was so developed that it was bound to invade the turbinates, ought to have been corrected years ago. Then the result would be perfect, and it would also prevent the turbinates from becoming diseased; but when the turbinates are already diseased, a submucous operation alone will not cure the pathologic condition, or relieve the patients of their complaints. After a submucous operation, the two flaps of the septal mucous membrane are united by connective tissue to form the future septum. This connective tissue obliterates the small blood-vessels as well as the secreting glands resulting in a dry mucous membrane on each side of the septum. Atrophic conditions

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(8) N. Y. Med. Jour., Nov. 22, 1919.

in the nose are always a contraindication for a submucous operation.

[It is rare to examine a nose where the septum does not show more or less irregularities. The conditions which really require correction are, however, extremely rare.—Ed.]

THE ACCESSORY SINUSES.

Latent Sinusitis in Relation to Systemic Infections. Two cases are cited by P. Watson-Williams,[9] one a case of rheumatoid arthritis with chronic catarrhal deafness, and the other a case of rheumatoid arthritis with appendicitis, etc. He believes that these cases prove that a latent sinus infection may persist for a great many years, that chronic rheumatoid arthritis and other infective rheumatic symptoms may be due to a sinus infection and that appendicitis may be due to infection through the gastro-intestinal tract from a nasal sinusitis. The previous history of nasal sinusitis cases is worthy of careful note. Williams also suggests that some cases of systemic septic infection attributed to tonsil infection may be due to a nasal sinusitis which has caused the tonsil infection with hypertrophy of the tonsil lymph tissue.

[We are pleased to note that the subject of focal infection, which has received so much attention in this country for some years past, is now attracting attention abroad. —Ed.]

Chronic Nasal Accessory Sinus Disease. In the 100 cases reported by H. C. Ballenger[10] the Roentgen-ray shows that twenty-eight were negative. Of these twenty-eight all but one showed no clinical evidence of sinus disease.

Of the seventy-two cases in which the Roentgen-ray revealed a cloudy sinus or sinuses, thirty-six were confirmed by surgical means, twenty-one were confirmed by clinical means other than surgery, four were postoperative—that is, plates taken from two weeks to six months

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(9) Jour. Laryngol., Rhinol. and Otol., July, 1919.
(10) Illinois Med. Jour., December, 1919.

after the sinus operation without unusual postoperative symptoms, leaving nine cases in which the sinuses were cloudy, but which showed no clinical evidence of sinus disease. Of these nine cases the plates showed part or all of the ethmoids cloudy in four cases. At the time of examination, no evidence of ethmoid disease could be found, although all the patients gave a history of having had former attacks of acute rhinitis with a watery or a mucopurulent discharge.

In one of the nine cases, a patient with hay fever, the plates showed the left antrum and ethmoid cloudy. At the time of examination a slight congestion of the nasal mucosa with some watery secretion was observed, but no more evidence of a sinus involvement could be found. The cloudy antrum and ethmoid could be explained through some former involvement which left a thickened mucous membrane. In another case the right sphenoid was cloudy with no clinical evidence of disease. The sinus was not opened and hence confirmation was not made. The man had had a previous sinus involvement in which the right antrum had been opened.

Of the three remaining cases the plates revealed dark antrums. One patient had had a cyst removed from the floor of the antrum about ten years before. The antrum was reopened and no pathology other than a thickened mucous membrane was found. The second antral patient had had a former antrum operation about one year before. The plate showed a cloudy antrum, but in the absence of any clinical findings and in view of a former antrum operation, the antrum was not opened.

The third antral case and the last of the nine cases which were not confirmed by clinical means was a patient who had had a tooth filled two years previously, since which time he has had a root abscess and later a continuous discharge from the tooth cavity, pain, tenderness and swelling over the region of the antrum, no nasal discharge and no evidence of pus within the nose. Investigation revealed a clear antrum, but a subperiosteal abscess over the region of the canine fossa, which evidently was the factor producing the cloudy appearance of the antrum.

It is interesting to note from a study of the cases that where the chief symptoms were a constant nasal discharge without pain or headache there were twenty-three cases (23 per cent.), three of these (12.5 per cent.) were negative and twenty (87.5 per cent) showed cloudy sinuses. Of the twenty cloudy cases three were not confirmed. In those patients in whom the chief symptoms were a constant nasal discharge with pain or headache there were seventeen cases (17 per cent.). All of these or 100 per cent., showed cloudy sinuses. One case was not confirmed.

In the group in which a nasal discharge was absent, but pain or headaches present, there were thirteen cases (13 per cent.). Eleven of these (84.66 per cent.) were negative and two (15.33 per cent.) were positive. Neither of these positive cases (No. 8 and 30) was confirmed.

There were six cases (6 per cent.) of intermittent nasal discharge. Four (66.66 per cent.) were negative and two (33.33 per cent.) were positive.

The chief complaint in ten cases (10 per cent.) was a post nasal discharge. Six (60 per cent.) of these were negative and four (40 per cent.) were positive. One of the positive cases was not confirmed. There were nine cases (9 per cent.) in which the chief trouble was a constant or intermittent nasal hydrorrhea. Three (33.33 per cent.) of these were negative and six (66.66 per cent.) showed some sinus disease. Of the six positive cases, one case was not confirmed. Six cases (6 per cent.) suffered from asthma. One patient (16.66 per cent.) had negative sinuses, the remaining five cases (83.33 per cent.) were positive. Tumor formation other than polypi was present in seven cases (7 per cent.). All (100 per cent.) revealed cloudy sinuses on the affected side. There were four sarcomas, one carcinoma, one lympho-endothelioma, and one fatty cyst involving the frontal sinus, frontal bone and orbit. Six cases (6 per cent.) had a polypoid degeneration. All (100 per cent.) showed one or more sinuses cloudy. One case (1 per cent.) was interesting inasmuch as the polyp which was filling the posterior portion of the inferior meatus apparently had its origin from the antrum. There were two (2 per cent.) of chronic atrophic rhinitis (ozena); one case (1 per cent.) of hay fever. All three cases were positive, although confirmation was not obtained in the hay-fever patient. In one case the Roentgenogram was taken about six months after both sphenoids had been opened and the middle turbinates removed incidental to an acute infection of the antrums and sphenoids. At the time the plates were taken, there were no symptoms or clinical evidence of trouble. The plates showed the outlines of the sphenoids and antrums were not clear.

Sarcoma in Frontal Sinus. Caliceti[1] illustrates a case of rapidly growing primary sarcoma originating in the frontal sinus in a soldier. So long as the growth was restricted to the sinus it caused absolutely no symptoms. When these appeared the growth had become inoperable. If discovered or suspected in an early stage, it might be well to try an autovaccine, as Citelli recommends. Caliceti obtained most gratifying results with an autovaccine in a case of sarcoma of the upper jaw. He reviews the literature on malignant disease of the frontal sinus.

Orbitopalatal Route of Transilluminating Maxillary Sinus. No new discovery as to principle is offered by H. H. Briggs[2] but one of application only.

The light should be from a small filament of ample intensity and controlled by a rheostat in order to bring out slight variations of translucency for comparison with that of the normal and with that of the fellow antrum. All possible escape of light against the patient's face, or into the room should be prevented and the room made jet black. The patient placed on a high stool is requested to tilt the head backward, gently close the eyes and to open the mouth so as to make a view of the hard palate possible. The light is placed a few millimeters below the margin of the lower lid and pushed inward and pointed downward until the infra-orbital ridge is well passed, when, with the cheek retracted, an area of pink will be seen on that portion of the roof of the mouth and outer antral wall surrounding the molars, corresponding with the floor of the antrum.

The value of transillumination depends on the obstruction which the contents of the antrum and its mucous

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(1) Policlinico, November, 1919.
(2) Southern Med. Jour., April, 1920.

membrane offer to transmitted light. Uncontaminated mucus alone offers a degree of resistance and normal mucous membrane offers even more. As the contained mucous becomes infected and contaminated, and the mucous membrane becomes swollen, hyperemic and indurated, the light becomes less penetrating, and when the sinus is filled with pus and detritus, especially in chronic cases, and the mucous membrane becomes highly thickened by the pathologic process, including polyps, a high degree of illumination becomes necessary to any degree of translucency. It is, therefore, necessary in order to perceive the slight degrees of variation that the light be directed through the least possible amount of bone and soft structures to be found outside the mucous membrane.

Treatment of Malignant Tumors of Antrum. Thirty-three malignant tumors of the antrum were examined at the Mayo Clinic within a period of thirty months. Of this group, G. B. New[3] states, that fifteen were so far advanced that it was believed treatment would not prove of benefit. Eighteen patients were treated by the use of the cautery and radium, although in many of these the lesion was so extensive that a resection of the jaw would not have been indicated. The giant-cell tumor and adamantinoma are not included in this list, as they are not true malignant tumors. Of the eighteen cases treated, sixteen were primary tumors of the antrum, and in two the antrum was secondarily involved by a direct extension from the upper jaw.

Squamous-cell epithelioma of the antrum is more than twice as frequent as sarcoma and it represents more than one-half of all malignant tumors of the antrum. Almost two-thirds of the malignant tumors of the antrum occur in males.

As a rule, the diagnosis is not made until the condition has become self-evident by the bulging cheek or palate, or the involvement of the floor of the orbit or the nose. The earliest symptom of malignancy of the antrum usually is pain. At first, it may be only a burning or an itching sensation over the cheek due to irritation of the fifth nerve. Later the pain is dull and is frequently re-

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(3) Jour. Amer. Med. Ass'n., May 8, 1920.

ferred to the teeth; it is usually relieved when the tumor perforates the wall of the antrum into the mouth or cheek. In some cases, the first complaint is nasal obstruction, and in others the increased nasal discharge brings the patient for an examination. In one case the patient's only complaint was a burning sensation over the cheek. He had no external signs of any neoplasm, nor increased nasal discharge. The antrum was dark on transillumination, and on exploration it was found to be filled with squamous-cell carcinoma. The nose may be obstructed or the cheek, floor of the orbit or palate may bulge as the condition becomes more extensive.

Frequently the antrum is irrigated from time to time and later repeatedly curetted until the external signs of malignancy develop, and the diagnosis is made, often when it is too late for radical treatment.

Maxillary Sinus in Rôle of Reservoir for Overlying Sinus Disease. Some of the measures and diagnostic refinements which, when applied, will help reduce failures to recognize those maxillary troubles caused by disease of the overlying accessory nasal cavities are reviewed briefly by H. Dupuy.[4] In cases of the class considered the maxillary is nearly always the sinus suspected. Transillumination can at best give only presumptive evidence. The Roentgen ray applied to the diagnosis of sinus disease is, in Dupuy's experience, becoming more trustworthy. For the purpose of unraveling this problem, skiagraphy gives positive knowledge as to the relation of the teeth to the floor of the antrum, and whether or not a particular tooth, which projects into the sinus, is diseased. When applied to the frontoethmoid cavities, a unilateral shadow can be relied on as indicating morbid changes. Of course, there must be a comparison of the two sides. A perfected technique, proper photographic positions and interpretation by an operator of large and special experience in this line, are very essential if any reliance is to be placed on this diagnostic means as a help in reaching a conclusion as to which sinus, or group of sinuses, may be responsible for having initiated the trouble. With certainty, however, the Roentgen ray will tell whether the sinus is

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(4) Southern Med. Jour., April, 1920.

divided by septa with the formation of an accessory cavity. This skiagraphic information will further secure the almost unfailing needle punctures through the nasal side. The puncture after all gives positive knowledge. When it is thus established that pus is present, the all-essential question is, to prove whether it is a product of inflammation within the maxillary, or whether it is the outcome of a flow into the antrum from the parts above it. If pus reappears in the middle meatus after the expiration of two hours it is definitely settled that it must come from one of the higher sinuses, frontal or anterior ethmoid. By continuity and contiguity of structure these two sinuses are usually coaffected. The final question is to determine whether the reservoir type of maxillary is itself the seat of actual disease and not simply a receptacle for the accumulation of pus. This can be readily ascertained by irrigating the antrum several times at intervals of forty-eight hours. When pus reappears at each irrigation a genuine sinus infection exists. To insure this method the diagnostic value it really possesses, proper drainage from the fronto-ethmoid region must have been previously established. To this end, a middle turbinectomy is practiced, all bony projections in the hiatus, especially those formed by the uncinate process and bulla ethmoidalis, are pared off, any existing polypoid masses are resected; in fact, the removal of any and all structural hindrances is effected. All is done with the object of making the line of least resistance for fluids moving along the hiatus *away from and not toward the maxillary sinus ostium.* When drainage from the fronto-ethmoid region along the more usual route in the hiatus has been re-established, the repeated irrigations of the maxillary will not fail in their diagnostic value.

[We commend the careful, painstaking method by which the author proceeds in the study of sinus disease. This is the only way that the study and treating of sinus disease should be undertaken.—Ed.]

Tuberculosis of Sphenoid Sinus. Although disease of the nasal sinuses has been found in a considerable number of tuberculous subjects at autopsy, it has been demonstrated to be of tuberculous nature in comparatively few cases. Dorner, in 1913, reported that he had found but thirty cases in the literature. The majority of these cases were in an antra. A few have had their origin in the frontal sinuses, and still fewer in the ethmoids. A case having its beginning in the sphenoid sinuses has not before been reported. J. D. Kernan's[5] case is therefore unique. The symptoms, in addition to the constitutional symptoms of tuberculosis, which, where the disease is limited to the sinuses and not active elsewhere, may be slight, are those of a chronic sinusitis with discharge and pain more or less depending on the freedom of drainage. The treatment in addition to the constitutional treatment, with the use of tuberculin, should be surgical. If the disease can be eradicated the prognosis is good. In extensive cases such as Kernan's, total removal is almost impossible, and although the result in this case has been so far favorable, a return of the disease is expected.

Hyperesthetic Ethmoiditis. This term is suggested by H. L. Pollock[6] to include a group of symptoms, described by various authors under the title of rhinitis nervosa, rose fever, spring catarrh, vasomotor rhinitis, coryza vasomotoria periodica and nasal hydrorrhea. A great majority of the cases are in young female adults, mostly in unmarried women, although it does occur in married women and occasionally in the male.

The disease simulates hay fever or hyperesthetic rhinitis to a marked degree, except in its time of appearance, its duration and severity, and is in no way associated with the ripening of the various pollens, to whose inhalation hay fever has been ascribed. The attacks scarcely ever occur during August or September, but if they do, the severity is lessened. As stated, the attacks come on at any time of the year; they are irregular in the time of their appearance, duration and severity. The paroxysms are often brought about by contact with, or inhalation of, a specific kind of perfume, a particular flower, the odor of various animals, a slight draft of air or the inhalation of ordinary dust

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(5) Laryngoscope, May, 1919.
(6) Illinois Med. Jour., February, 1920.

following an automobile trip or train ride, or may come on apparently spontaneously.

These paroxysms begin usually just upon arising, with attacks of sneezing, varying in number from five to fifty times, followed immediately by a profuse watery discharge from the nose. At the same time there is a reddening of the mucous membrane of the eyes, accompanied by profuse lachrymation. The nose becomes blocked and breathing is naturally difficult. These symptoms may be of short duration, an hour or so, or they may continue for six or eight hours and suddenly abate only to reappear on succeeding days or when the patient is again brought into contact with the specific irritant. Some of these acute attacks may continue for a week or ten days, and some only a day.

The underlying pathologic condition of this disease has not been determined. The diagnosis is comparatively simple when once the condition is in full force. The prognosis without intervention is bad, as the attacks invariably return, and, while they do not seriously undermine the general health of the individual, they cause a great deal of annoyance and discomfort. With proper treatment, the prognosis is good and nearly every case will respond to the treatment. Temporary relief is obtained from the injection of the sphenopalatine ganglion. Permanent relief is obtained from bilateral ethmoid exenteration.

[The symptoms in these cases resemble somewhat those characteristic of the hyperplastic ethmoiditis, especially the sneezing attacks. On the other hand, the symptoms are more like those of typical hay-fever and are apparently the result of the patient becoming sensitized to certain substances. We do not consider the process as a disease of the ethmoid any more than that hay-fever is an ethmoid disease. All of the nasal membranes are involved and operating on the ethmoid is not followed by the favorable results which we note in the hyperplastic form of ethmoiditis.—Ed.]

Ethmoidal Malignancy. The rarity of malignancy in nasal diseases and the results obtained from the early use of radium in treatment lead P. A. Jordan[7] to report

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(7) California State Med. Jour., May, 1920.

two cases. He has seen four cases of intranasal malignancy. Three patients died rather speedily after diagnosis was established. The fourth patient is undergoing rapid decline. One patient, aged 55, with a history of chronic rhinitis, came under Jordan's observation in April, 1917, for acute otitis media and acute mastoiditis, left. Recovery took place without operation other than paracentesis. A portion of the inferior turbinate was removed, and much pus drained from enlarged bulla. Malignancy was not suspected. One month later, a granular tumorous, bleeding mass was removed including a much degenerated inferior right turbinate. The antral wall was absent, and much granular tissue was removed from the antral cavity and ethmoidal region. A diagnosis of carcinoma was made. Under Roentgen-ray and radium treatment, the mass disappeared and the disease so far has not returned.

In the second case a submucous resection, middle turbinectomy and ethmoidectomy was done for polypi. One year later the patient returned, complaining of nasal hemorrhage and pain in the region of the right ethmoid, and exhibiting exophthalmos of the right eye. Inspection showed the ethmoidal region to be filled with new growth. Malignancy was suspected. The Wassermann test was double positive. Hope was entertained that the growth might be a gumma. The ethmoidal region was extenterated. The diagnosis was sarcoma. Radiograms showed a new growth filling the ethmoid region, the lower half of the orbit and the right antrum. Roentgen-ray and radium treatment were not tried.

Seventeen days after extenteration of the ethmoid, the patient presented very marked exophthalmos right and much pain. Vision right eye 6/200.

Operation: Enucleation, extenteration orbit, ethmoidal region, antrum of Highmore. Bony partitions were largely absent.

There was rapid return of the growth until at death of patient March 16, or two months after enucleation the growth measured 16 cm. by 12 cm. by 7.5 cm.

Surgical Treatment of Ethmoid. The majority of the operators who have written in the past on surgery of the ethmoid have advocated the removal of the middle turbinate or a portion of it. **J. A. Pratt**[8] **has not found** it necessary to remove any part of the middle turbinate in order to exenterate the ethmoids or to open the frontal or sphenoidal sinuses intranasally. In his opinion, the principal cause of ethmoid trouble is some abnormality of the septum, and one must operate on the thick as well as on the deflected septum, restoring not only ventilation, but equal distribution of air. Whenever the septum interferes with the ethmoidal operation, it should be operated on first. In his clinical work Pratt finds anterior ethmoidal trouble when the frontal sinus is affected, and generally disease of the entire ethmoid capsule when the sphenoid is involved. The ethmoid is the gateway to these troublesome sinuses.

An Ethmoid Operation. The operation described by J. A. Pratt[9] is said to be original. He says: With the patient in a sitting position, and the part cocainized, the head is thrown well back, and if there is polypoid degeneration present, the anterior ethmoid cells are opened with the nasal cutting forceps, biting just under the anterior end of the middle turbinate and continuing backward and upward as long as soft bone is encountered. Curette out all the soft cells with the straight end of the curette. With the angle end of the curette any anterior cells are now removed, enlarging the space upward toward the frontal sinus. Cut out the floor of the capsule back to the sphenoid sinus, giving a free open space under the entire length of the middle turbinate. There is little bleeding owing to the fact that neither the anterior nor posterior ethmoid nor the sphenopalatine arteries are cut.

The cavity is next wiped out with large swabs, using a whirling movement to collect any particles of bone or débris, and then a large swab of cotton saturated with 3 per cent. of iodine in glycerine is applied in the cavity for a few minutes to stop the bleeding and disinfect the cavity. If the capsule does not show definite softening or polypoid degeneration, the straight end of the curette is possibly the best instrument to use to enter the anterior ethmoid cells; or it may be necessary to

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(8) Jour.-Lancet, April, 1920.
(9) Ann. Otol. Rhinol. and Laryngol., December, 1919.

employ a chisel; however, after some experience the cutting forcep is generally used.

The cavity is not packed but a finger-shaped piece of cotton is placed in the middle meatus and the patient is allowed to go home, with instruction to remove the cotton in four hours and report in three days. The home treatment consists of dropping a few drops of nasal oil into the nostril three times a day, having the patient in the prone position, with the head well back, and as the medicine is dropped into the nostril, the patient is told to sniff violently. Every third day, after cocainizing and cleaning the nose, the cavity under the middle turbinate is swabbed with the iodine-glycerine solution. In a short time, it is hard to detect that the nose has been operated upon. If, after a suitable length of time the discharge does not cease, the nose can be recocainized and the operation easily extended into the sphenoid or, by the use of the Thompson-Good rasps, a large opening can be made into the frontal sinus.

[We see little difference in this method of operating from the methods followed by Mosher and Shambaugh. The ethmoid labyrinth is exenterated by means of a currette or biting forceps. Whether this can be done to advantage without disturbing the middle turbinated body depends on the relations existing in this region. In the majority of cases, the middle turbinal may be left standing but when the nose is narrow the removal of part of the concha media is advisable. Where an irregular septum interferes with the operation it will be necessary to correct this before proceeding with the ethmoid operation. We do not consider the irregular septum as an important factor in causing ethmoid disease.—Ed.]

OZENA.

Ozena. H. A. Schatz[1] obtained marked improvement in most of his cases (possibly one cure) with a polyvalent vaccine made up from *B. mucosus*, Friedländer, cultures derived from ozena cases.

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[1] Laryngoscope, January, 1919.

Treatment of Ozena by Transplantation of Parotid Duct. At a recent meeting of the Vienna Medical Society, Professor Meyer[2] reported the results of a series of cases of ozena, treated on the principles of Wittmaack. This method is based on the fact that the symptom most distressing to these patients, the odor, can be palliated by constant washing out of the nose. Wittmaack had the ingenious idea of producing a continuous irrigation of the nose by implanting the parotid duct into the nasal cavity, thus causing the saliva to keep the nasal mucosa moist. This produced a sort of liquefaction of the nasal discharge, with avoidance of crusts and absence of the peculiar odor. The operation is very simple. An opening is made in the canine fossa similar to that for operation on a maxillary empyema—under local anesthesia—just opposite the duct. The duct is then freed for about half an inch, with sufficient margin of mucous membrane to permit of a flap, and implanted into the maxillary antrum with a few stitches. It quickly resumes its function, and saliva appears in the nose, especially at meals. In one of the cases the profuse flow caused more inconvenience than the ozena before operation, and this patient had the operation "undone" because of the profuse salivation; the previous condition was easily restored. But the majority of the other patients greatly benefited. The time that has elapsed since the introduction of the operation is not long enough to say what permanent benefits will be derived from it.

HAY-FEVER.

Protein Sensitization in Asthma and Hay-Fever. A preliminary report is made by A. H. Sanford[3] on the work done thus far on protein sensitization in asthma and hay-fever in the Mayo Clinic. Tests have been made on more than 800 patients during the past two years. Of this number, more than 500 were entirely negative in the skin reaction. The reactions of about 100 more were doubtful. The remaining patients, more than 200

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(2) Lancet, April 3, 1920.
(3) Minnesota Med., April 20, 1920.

in number, had definite skin reactions. Twenty-eight persons reacted positively to some of the animal emanations. The largest number of reactions was to horse dander. One hundred persons reacted to one or several of the proteins derived from foods. The greatest number of reactions was to egg white; eleven patients in all were sensitive to this protein. Twenty-five patients had marked positive reactions to grain. Twenty-eight patients were sensitive to vegetable proteins. This group, on the whole, is negative. Fruits, apparently, have little to do with asthma. In several instances banana gave marked reactions. Twice it was known to be a definite factor in producing asthma. In 365 tests to *Staphylococcus pyogenes aureus* and *Staphylococcus albus* there was not a single reaction. Of the patients sensitive to ragweed and other fall pollens, fifty-two were definitely positive, thirty-six with hay fever and sixteen with both hay-fever and asthma.

Pollen Extracts and Bacterial Vaccines in Hay-Fever. Using as a pollen unit a dosage equivalent to 0.0000001 gm of pollen, I. Frank and S. Strouse[4] usually begin treatment with an injection of 10 pollen units, increasing by various multiples, depending on the reaction of the patient.

There was considerable variation of opinion regarding dosage of pollen extract, and it seemed to the authors that the only possible solution of this problem lay in the therapeutic test. In some cases the dosage ran as high as 3,000 pollen units. As no data were available on the best method of injection, they decided to try the combined prophylactic on a comparatively large percentage of the patients. Of eleven patients treated by the combined injections of pollen units and stock vaccines benefit of varying degree is noted in five, and in only one could the result be considered a seasonal cure. Ten more patients were treated by prophylactic injections of ragweed pollen, followed at the beginning of the hay-fever season, by the combination of vaccines and pollen extracts, or in some cases by bacterial vaccines alone. Three patients were treated by increasing doses of bacterial vaccines alone during the course of the at-

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(4) **Jour. Amer. Med. Ass'n., May 31, 1919.**

tack, two of whom showed some relief and one a seasonal cure. In contrast to these three are six patients given combined pollen extract and bacterial vaccines during the attacks. Of these six, four showed absolutely no effect, none was cured, and two were moderately relieved.

Summarizing the results in 1916, there was some benefit in a little more than half of the patients treated. Nothing like the startling results of the previous year was obtained. Perhaps the most important lesson was the negative value of some of the procedures. From the work this year it seemed unwise, first, to use such large doses of pollen extract; second, to carry the pollen extract injections through the period of hay-fever attacks; third, to combine the pollen and the bacterial vaccines in prophylactic injections, and, fourth, to use stock vaccines. In 1918, the authors treated only sixteen patients, and they were all treated in practically the same manner. They used one of the commercial pollen extracts (ragweed), started injections in July and continued to the height of the season, when autogenous vaccines were made and intensively injected. All but two of the patients treated in this manner remained in Chicago throughout the hay-fever season in considerable comfort, and all felt that the relief from suffering was remarkably good. The two patients who went away before bacterial vaccines were started suffered rather intensely from hay fever in a supposedly hay-fever-free section of Michigan. The results in 1918 compared favorably with those of the 1915 season.

The authors advise that specific therapy should not be undertaken in the presence of pathologic conditions in the nose or accessory sinuses. It has not been their experience that removal of polyps or a similar operation has cured hay-fever patients, but it has been their experience that such operations may be necessary if subsequent therapy is to be successful. They believe it is fair to say that the method of treating hay-fever patients by early prophylactic injections of pollen extract, combined with late and intensive injections of autogenous bacterial vaccines, offers the greatest therapeutic promise of any method so far advanced in the treatment of this disease. Pollen extracts alone and bacterial vaccines alone, while giving results, do not seem to relieve so many patients as does the combined therapy. Treatment with pollen extract should start early in the season (June or July) and should be discontinued at the height of symptoms, at which time bacterial vaccines should be substituted. The authors have not found that injections one year have prevented attacks the succeeding year, but note that in patients receiving continued treatment from year to year there is a definite tendency for the hay-fever symptoms to become progressively less severe.

Nasal Reflex in Asthma. In offering his explanation of asthma as a nasal reflex, G. Sluder[5] says, it must be assumed that the sympathetic nervous system is also capable of transmitting afferent impulses which are not painful sensory ones, because many patients with nasal asthma do not have any pain of any kind. If this be true, the explanation of asthma as a nasal reflex becomes possible.

It is known that the sympathetic nervous system in the nose is derived from the nasal ganglion. This receives its sympathetic nerve supply from the vidian nerve; the great deep petrosal; the carotid plexus; the superior cervical ganglion, etc. If, then, the sympathetic nervous system has the power of transmitting afferent impulses, the impulse may readily be traced from the inflamed nose by way of the nasal ganglion, the vidian nerve, the carotid plexus, to the sympathetic trunk in the neck to the lower cervical and first thoracic ganglions, which are often united, and frequently spoken of as the stellate ganglion.

Through this ganglion pass the fibers from the second, third and fourth thoracic nerves that turn downward, being accelerator fibers for the heart, and vasomotor fibers for the lung.

If the asthma reflex may be best controlled from the nasal ganglion or the sphenoid sinus, they should also be the places from which the reflex may at least sometimes be started experimentally, or accidentally. This has also been Sluder's experience, as the cases he reports show.

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(5) Jour. Amer. Med. Ass'n., Aug. 23, 1919.

In some cases, intelligent effort to prove some sensitization to proteins failed to reveal it. These cases were apparently of local inflammatory origin. Some were acute, and some were chronic hyperplasia, without bacteria that could be grown by our present laboratory methods. Others, such as the hay-fever group, are clearly sensitive.

Clinically, the local inflammatory cases depend for their relief on the control of the local lesion. Aside from the indicated surgery, an autogenous vaccine, when bacteria can be grown from the lesion, is sometimes helpful, making the interval between coryzas longer. The cure of the case depends on the cure of the local lesion. Inasmuch, however, as no preventive for coryzas is known at present, the acute inflammatory action so produced in that district is apt to rekindle the trouble. This has been Sluder's experience. The patients may be much relieved, just as headaches from such lesions may be very greatly relieved, but there are almost sure to be recurrences, just as a coryza in that district can always make headache, because the nerves remain in their vulnerable positions, and are affected by the inflammatory action.

DISEASES OF THE THROAT.

GENERAL CONDITIONS.

Fate of Bacteria Introduced into Upper Air Passages. Reaction of Saliva. One hundred and two observations were made by A. L. Bloomfield and J. G. Huck[1] on fifty-two clinically normal individuals during a period of about two months. The specimens were collected at various times during the day and at night without particular reference to the intake of food or fluid, smoking, or cleaning the mouth. The reaction of 80 per cent. of the specimens fell within the range of pH 6.6 to pH

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(1) Johns Hopkins Hosp. Bull., April, 1920. A previous article on this subject by Bloomfield is abstracted in Practical Medicine Series, Vol. I, 1920, p. 263.

7.1, although the limits for the whole group were pH 6.0 to pH 7.3.

A number of readings were made on saliva from the same persons at various times to determine whether the reaction was constant in any one individual and if not whether any regular variation occurred. It was found that the variation in the individual covered practically the entire range of the normal reaction, although many of the repeated observations were made at the same time of day and under the same conditions. In a few cases several observations were made during the course of the day to see if there was any regular diurnal variation. There was none or very little. A few tests were made to determine the effect of food on the reaction, by examining the saliva immediately before and after meals. No striking changes were noted. Smoking failed to alter the reaction.

Determinations were made to discover any possible alteration in the pH of the saliva following cleaning the mouth and irrigating with the usual gargles used in medical practice. Washing with distilled water led to no change in reaction of the saliva, and gargling with Dobell's solution, potassium chlorate 25 per cent., and potassium permanganate 1-10000 caused only brief alterations which were no longer striking after 30 minutes. The effect of internal administration of acid and alkali was tested. The change in the reaction of the urine was not paralleled by any alterations in the salivary reaction.

Hemolytic Streptococci in the Normal Throat after Tonsillectomy. The hemolytic streptococci found by H. B. Van Dyke[2] in the throats of twenty-five of the fifty-five persons examined were Gram-positive organisms which in broth formed chains of from five to sixty cocci, each strain forming chains of approximately the same length. Definite differences in the size of the individual cocci were common.

On blood agar were noticed chiefly two types of colonies: one markedly hemolytic, the individual colonies being surrounded after twenty-four hours by a hemolytic zone from 2 to 4 mm. wide, and another consider-

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(2) Jour. Amer. Med. Ass'n., Feb. 14, 1920.

ably less hemolytic, its surrounding hemolytic zone being less clear and usually only about 1 mm. wide. Microscopic examination of these colonies under low power revealed the fact that, while all of the corpuscles in the hemolytic zone of the first type of colonies were completely hemolyzed, hemolysis was not quite complete in the hemolytic zone of colonies of the second type, and at the same time the corpuscles which were not hemolyzed were little discolored. The first type of colony resembled that described by Brown as the colony of the Beta (β) type of hemolytic streptococcus, the second resembled Brown's Alpha prime (*á*) type of hemolytic streptococcus. The organisms are so designated. After cultivation in the enrichment medium almost always there was a great preponderance of either the Alpha prime or the Beta type of organism when either was present. Twenty-one strains were tested by the fermentation reactions. The fermentation reactions of these streptococci were typical of hemolytic streptococci. According to the classification of hemolytic streptococci by fermentation reactions as suggested by Holman, the organisms tested would be divided into two groups, *Streptococcus anginosus* (fermenting lactose but not mannite and salicin) and *Streptococcus pyogenes* (fermenting lactose and salicin but not mannite).

The method employed in this work differs from that of most investigators in that a routine preliminary cultivation of the throat cultures in blood broth was made.

Intratracheal injections. Menthol, guaiacol, camphor, adrenalin and sometimes iodine, always dissolved in some bland oil, preferably liquid petrolatum, are the medicaments T. W. Moore[3] used. And with the possible exception of guaiacol, where he noticed reduction of temperature and other constitutional benefits after its use, his treatment has been directed entirely to the local ailment and not as a method of administration for maladies whose pathology does not involve the locality immediately treated, although the earlier papers offered much encouragement for making this a method of administration of remedies whose action was intended to be systemic. His method has been always with the mir-

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(3) Southern Med. Jour., August, 1919.

ror and not by direct bronchoscopy or tracheoscopy. Sometimes in homes where it is impossible to use the mirror he has tried to apply the method advocated by Mendel in 1905, which consisted in holding the tongue out of the mouth and having the patient refrain from swallowing. The pharynx thus forms a funnel the only inferior outlet of which is the glottis, as the gullet opening is closed, therefore a small amount of liquid projected against the wall of the pharynx runs down into the air passage. This is greatly facilitated if the patient will inspire at the time the liquid is introduced. With the syringe of Arrowsmith for the patient's use Moore has not had the success reported by some others.

Throat Cultures in Measles. A routine throat culture was made by R. H. Knowlton[4] in 458 cases of measles. The cultures were taken postnasally with a wire swab, bent at right angles, and applied to a small area of a human blood-agar plate. The spread was made with a platinum loop wet with a drop of salt solution. The culture was examined next day and colonies resembling hemolytic streptococci picked and planted in broth. The following day the broth was examined and mixed with an equal amount of 5 per cent. suspension of red blood corpuscles and incubated for not over an hour, to determine the presence of hemolysis. Only those showing this reaction were considered positive. The percentage of positives for hemolytic streptococci varied materially in different weeks, the lowest being 19 per cent. the fourth week, and the highest 45 per cent. the eighth week. It also varied in different wards.

There were thirteen deaths in the 458 cases, a mortality of 2.7 per cent. Among the forty-eight pneumonias there were ten empyemas, the hemolytic streptococcus being the predominating organism, and six of these patients are now dead. From the forty-three cases of suppurative otitis media there were five cases of mastoiditis. There were also noted three cases of frontal sinusitis and two of peritonsillar abscess and one acute appendicitis. There were two cases of meningitis; one due to the meningococcus, and four carriers were found in this ward. In the other case, hemolytic streptococci

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(4) Jour. Amer. Med. Ass'n., May 24, 1919.

were found in the spinal fluid and the case went on to a rapidly fatal termination. This case presented a streptococcus otitis media, but at the necropsy there was no evidence of direct extension to the brain. Pneumonia and otitis media occurred in the same proportion in the streptococcus and non-streptococcus throats. Each patient was asked if he had ever had measles before, with the following results: never had measles, 385; German measles only, 44; had measles before, 29, or 6.3 per cent. That is to say 96.3 per cent. of the measles cases came from the country and 93.7 per cent. of the patients had not had measles before. The figures as they stand reveal that in this hospital there was no relation between the presence of hemolytic streptococci in the throat and the occurrence of complications. This does not accord with the conclusion reached by Levy and Alexander in their work at Camp Zachary Taylor. After seeing this number of cases the authors believe that plenty of space and abundance of fresh air are large factors in preventing complications, and that whatever may be said of the value of isolation, it can not take the place of proper treatment.

Amyloid Tumors of Upper Air Passages. Amyloid tumors of the upper air passages are rare. They occur as part of a general amyloidosis in which other organs of the body may be involved, or as a local condition. G. B. New[5] has found on record forty-two cases of amyloid tumors of the upper air passages. Four cases have been observed in the Mayo Clinic. The symptoms vary with the location of the tumor. In many of the cases reported there were no local symptoms, but the condition was accidentally found at necropsy. When the larynx and the trachea are involved the symptoms are such as accompany benign neoplasms of slow growth. These tumors are most common in the larynx. They are found in the larynx three times as often as in the trachea, which comes next in the order of frequency. The larynx or the trachea was involved in thirty-eight of the forty-six cases, the larynx alone in twenty-seven, the trachea alone in five, the trachea and larynx in six, the tonsil in one, associated with the condition in the tongue, and the

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(5) Laryngoscope, June, 1919.

pharynx in one, associated with the condition in the larynx. In one patient three organs were affected, the larynx, the trachea, and the bronchi. Although the clinical picture is fairly typical of amyloid tumor, the diagnosis must be made microscopically. In cases of localized tumors, surgical removal, either by the endoscope or by thyrotomy, seems indicated. If the amyloidosis is diffuse and involves the entire circumference of the larynx and trachea the removal will probably result in the loss of voice and necessitate the permanent use of a tracheotomy tube because of secondary contractions. The procedure seems justified, however, if the disease is extending down the trachea. New has employed fulguration and radium with marked improvements in all his cases, except one, in which a thyrotomy was done and the diffuse amyloid infiltration that involved the circumference of the larynx and trachea was removed. This was followed by radium.

Influenza with Throat Complications. A case of influenza followed by pneumonia, laryngitis, suppurative acute right otitis media, and hypertrophic tonsilitis, bilateral of the streptococcus type is reported by J. H. Bryan.[6] The larynx was congested, the congestion extending well down into the trachea. There was a marked ulcerative condition noted along the free margin of the epiglottis, the free margin of the right vocal cord over the processus vocales of the left vocal cord, and near the apices of the arytenoid cartilages. The character of these ulcerations was unique in that the mucous membrane covering the cartilages was not actually broken through, but there was an undermining of the submucous tissue leaving marked depressions with cup-shaped and everted margins. This was especially true along the margins of the epiglottis. Another interesting feature of these depressions in the mucous membrane was that they were dry, no secretion whatever being in evidence. The mucous membrane had a highly glistening appearance, which is quite unlike the usual forms of ulcerations encountered in the larynx, but is typical of ulcerations of streptococcus origin. The tonsils, which may have been the primary source of the

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(6) Ann. Otol. Rhinol. and Laryngol., December, 1919.

infection, were enucleated, with marked improvement in the patient's general and local condition. The ulcerations in the larynx healed completely.

Lupus of Upper Air Passages. R. Webber[7] believes that in the vast majority of cases of lupus, the condition first appears in the nose. This was the case in 113, or 88 per cent., of the 128 cases studied by him. The disease began either on the anterior part of the nasal septum, on the mucous membrane of the outer wall of the nose and close to its junction with the septum, or on the anterior end of the inferior turbinate. In a certain number of cases there was an extension of the disease to the mucosa of the hard and soft palate, the pharynx or larynx, without evidence of skin lesion, but in sixty-nine, or 52 per cent. of the cases, skin involvement was noted on the face. Glandular involvement occurred in forty-eight cases, the glands most frequently affected being those of the submaxillary chain. As worthy of note, Webber calls attention to the fact that in twelve of these cases there were present scars following operations for old submaxillary gland trouble. He infers that at the time of such operation the disease within the nose causing the gland enlargement was present but overlooked. One of Webber's patients has been under treatment for lupus for thirty-two years. In the treatment of lesions on the palate and alveolar process, the best results were obtained from curettage and the application of lactic acid (75 per cent. solution) or the electric cautery. For lupus of the nose, Pfannenstiel's treatment was distinctly helpful. This consists in curettage and packing the nasal cavities with gauze soaked in hydrogen peroxide, and sodium iodide internally. In lupus of the epiglottis and the laryngeal mucosa, removal of the diseased area with cutting forceps often has resulted in a cure, or, at least, arrest of the disease. The Roentgen rays have been used largely in the past in the treatment of the associated skin condition, but at the present time they are used only in selected cases. Webber emphasizes that no matter what treatment is selected, only the closest co-

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(7) Jour. Laryngol. Rhinol. and Otol., January, 1920.

operation between the patient and the person in charge of the case will produce the best results.

Preference of Tracheotomic Bronchoscopy to Peroral Route. St. Clair Thomson[8] reports the case of a child who had aspirated an extracted, lower temporary molar so that the tooth was tightly impacted in an externolateral secondary bronchus of the left lung. Two attempts at peroral removal of the foreign body failed. The third effort was made through a tracheotomy wound, and from the commencement of that operation to the extraction of the impacted tooth, the time occupied was exactly twenty-nine minutes. The tracheotomy opening brought the tooth nearer by more than two inches. The advantages claimed for this method are:

Less anxiety with the anesthetic, as the administration through a tracheotomy opening avoids all pharyngeal and laryngeal reflexes and is therefore much smoother and safer.

Ability to succeed without several trained assistants, as there is no longer the necessity to mobilize the head.

The use of a wider and shorter tube, thus obtaining better illumination.

A larger field of vision.

Increased facility of manipulations.

Less leverage and traction on the important structures at the root of the lung.

Shorter sitting.

Greater certainty in result.

In the event of failure, or of the foreign body shifting its position during the séance the tracheotomy is a decided security.

Antistreptococcus Serum in Quinsy. On the assumption that the primary cause of quinsy was a streptococcus, N. C. Forsyth[9] determined to treat all cases of quinsy with antistreptococcus serum. Cases were selected in which the abscess had not perforated and in which the conditions were definitely acute. The following routine was adopted; Serum (10 c.c.) was injected at once; if there was any reason to suspect diphtheria 2,000 units of antidiphtheria serum were added. Ten

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(8) Laryngoscope, February, 1919.
(9) Brit. Med. Jour., March 13, 1920.

cases only were treated. The most definite result obtained in these cases was the relief from pain in from six to twelve hours; the more or less acute pain when swallowing was eased some hours after that, but within a definite time before the abscess ruptured. In no case was incision of the abscess required by reason of the severity of the symptoms, and in all so treated there was pus discharging from the abscess on the fourth day of the illness. The temperature approximated normal one or two days after the serum injection.

Erosive Angina. P. Harvier and de Léobardy[1] encountered three cases recently which do not fit the description of any known type of sore throat. The infectious process affected only the anterior pillar, and only on one side. The oval lesion is more an erosion than an ulceration, and there is no false membrane formation, but the onset is febrile and stormy, and the glands nearby show slight congestion. The lesion does not spread, but it lasts for three weeks and then subsides, regardless of the local measures applied. Bacteriologic tests showed cocci and an occasional staphylococcus.

Chromic Acid in Treatment of Vincent's Angina and Other Fusospirillar Infections. W. Dubreuilh[2] recommends in Vincent's angina and in analogous infections a saturated solution of chromic acid, applied with a firmly twisted cotton swab. The oxidizing power of the chromic acid is such that if the solution is fresh and one does not use the swab at once after moistening it in the solution, it will begin to fume and the cotton will be found to be carbonized. The swab should therefore be barely moistened and not allowed to accumulate superfluous liquid. The ulcerations are rubbed rapidly and vigorously with the swab so as to detach mechanically the false membranes and to bring the solution in direct contact with the ulcerated surface. The patient should also be allowed to rinse out his mouth at once, but should be cautioned not to swallow any of the saliva mixed with the acid. Occasionally it may

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(1) Bull. de la Soc. méd. d. hôp., Dec. 26, 1919.
(2) Jour. de méd. de Bordeaux, March 25, 1920.

be necessary to make a second application about the fourth or fifth day.

[The use of chromic acid for these lesions seems to us a rather heroic treatment, especially as the lesions of Vincent's angina respond so readily to the use of less dangerous agents, for example, 5 per cent. solution of silver nitrate, or argyrol, 10 per cent. solution.

Treatment of Vincent's Angina. Capitan[3] has treated 200 cases of Vincent's angina with intramuscular injection of 6 c.c. colloidal arsenic, and states that it never failed to sterilize the lesions in from twenty-four to forty-eight hours, and the cure was complete in four or five days. A second injection was only exceptionally required. Local treatment is not absolutely necessary.

[In severe cases the employment of salvarsan has been followed by satisfactory results.—Ed.]

Throat Antisepsis in Diphtheria. A clinical study of fifty consecutive vaccine-treated cases by J. L. Brownelle[4] shows that local antiseptic throat applications are unreliable cures for the carrier and the positive throat. Diphtheria vaccine produces well-defined degeneracy in morphologic appearance of the cultured organism, followed by its complete dispersal from the locality invaded. In the past, the diphtheria carrier has been subjected to hospital residence for weeks, perhaps months, which was avoidable. Diphtheria vaccine is effective in the treatment of the positive throat of diphtheria convalescents, and its use is administratively and economically sound.

[The removal of the tonsils of diphtheria carriers has been shown to be a satisfactory method of curing these cases.—Ed.]

Hoffmann Bacillus and Diphtheria in India. The bacillus of Hoffmann was found by R. Knowles[5] in 30 per cent. of cases of diphtheria; in 11 per cent. of diphtheria carriers, showing the true Klebs-Loeffler bacillus; in only 0.4 per cent. of healthy throats among European children during an epidemic; and in only 5 per cent. of the throats of 103 Hindoos in the absence

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(3) Bull. de l'Acad. de méd., Dec. 9, 1919.
(4) Lancet, March 27, 1920.
(5) Indian Jour. Med. Res., July, 1919.

of any epidemic. The bacillus of Hoffmann was met with (*a*) before, (*b*) with and (*c*) after the presence of the true Klebe-Loeffler bacillus in the same throat. While the two organisms appear to be entirely different as regards morphology, cultural reactions and pathogenicity to animals, yet it is suggested by Knowles that there is a symbiotic relationship between them and that the rarity of the bacillus of Hoffmann in India may be associated with the relative rarity of diphtheria in epidemic form. Reverse conditions hold in temperate climates.

ESOPHAGUS AND BRONCHI.

Foreign Bodies in Esophagus and Respiratory Passages. I. Moore[6] pleads for the abolition of the coin-catcher, the blind use of the bougie and probang, and their replacement by the direct endoscopic methods of extraction. He cites the case of a little girl, aged 4 years who accidentally swallowed a halfpenny which was impacted in the esophagus for six days. The coin was removed by the esophagoscope, after repeated attempts with a coin-catcher had failed. Moore has adapted the Kahler electroscope for use with Brünings' or Hill's tubes.

Of the thirty-seven cases of coins in the air-passages collected by Moore during a period of nearly a century (from 1819 to 1915), twenty-two were impacted in the larynx, three were in the trachea, nine in the right bronchus, one in the left bronchus, while the remaining two were stated to be in a bronchus (in which lung was not stated). Seventeen were coughed up (eight assisted by inversion), and two coughed up into the mouth, swallowed, and later evacuated *per anum.* Death occurred in only four cases; from pulmonary tuberculosis in three, and apoplexy in one. Thyro-fissure was performed in one, laryngotomy in two, and laryngo-tracheotomy in three cases (in one of these the coin was coughed up, swallowed, and later evacuated *per*

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(6) **Lancet, Sept. 27, 1919.**

anum). Laryngeal forceps were used in six cases, no attempts at removal in two cases, and per-oral endoscopy was employed with success in three cases. The longest sojourn of a coin in the larynx was six years (the case of Petrie) and in the bronchi ten years (the case of Dupuytren).

Removal of Coin-Catcher Through Esophagoscope. J. W. Harrison[7] relates the history of a child, aged 3 years, who swallowed a halfpenny. The Roentgen ray revealed a coin impacted half way down the esophagus. A coin-catcher with a winged swivel end was introduced by a local practitioner, and although the coin could be felt it was not found possible to extract either it or the coin-catcher. Further attempts to remove the instrument under an anesthetic were unsuccessful. Harrison passed a Hill's esophagoscopic tube of suitable size, proximally illuminated by a Brünings' combined handle and lamp, the tube engaging the protruding whale-bone shaft of the coin-catcher. There was some difficulty in getting the instrument through the postcricoid pharynx and mouth of the esophagus, owing to the large amount of blood-stained and frothy saliva present, which made vision difficult. Having passed the esophagoscope into the gullet, Harrison removed the obscuring secretions as well as possible by suction and continual swabbing; the wall of the gullet was found to be lacerated, tongue-shaped pieces of mucous membrane being visible. The distal end of the coin-catcher was seen; the wings were separated at an increased angle and were crushed together by Irwin Moore's forceps, so that the subsequent removal of the instrument was simple.

On the fifth day after the operation the child's temperature rose to 103° F., pulse was 148, and dullness on both sides of the back was noticed from the base of the lung to about the fourth dorsal vertebra.

Ten days after the adventure with the coin-catcher —a needle was introduced on the left side in the sixth intercostal space, and some fluid, somewhat hastily presumed to be pus, was withdrawn. A part of the sixth rib was resected, and a large quantity of milky whitish

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(7) Lancet, Dec. 20, 1919.

fluid, containing some coagulum, was let out. A drainage-tube was inserted. The fluid withdrawn was found to consist almost entirely of milk. The bacteriologic examination showed that there were no pathogenic organisms present, and that it contained only lactic acid, bacteria, and yeast. The coin was evacuated in the normal way two days after the operation. The child made an uneventful recovery in spite of the wall of the gullet having been completely torn through. The pleural cavity was free from septic organisms, although milk in considerable quantity had passed into the cavity through the perforation in the gullet and pleura.

Extrusion of Inhaled Foreign Body. The foreign body in the case cited by G. W. Johnson[8] was a head of grass. An abscess about the size of a tangerine orange developed in the right mid-axillary line, the center of the swelling being over the seventh rib. Operation was refused. A few days later the abscess burst, discharging a large quantity of pus. A head of "barley grass" 1¾ inch in length, was discharged from the abscess.

Foreign Body in Bronchus. While a girl, aged 11, was playing with a toy air balloon, she laughed, the balloon disappeared into her mouth, and she became cyanosed and could not speak. She rushed into the street, attracted the attention of a man there and, by pointing to her mouth, indicated what was wrong. He inserted his finger into the child's mouth and "pushed something down her throat." She was then able to breathe with comfort and to speak.

When W. R. Cammock[9] saw her, three days after, she looked like a patient suffering from pneumonia, very different from the picture of laryngeal or tracheal obstruction. The cheeks were flushed, the temperature 101°F., respirations 46, pulse 104. She had slight cough, with a little mucopurulent expectoration. The whole of the left lung was dull to percussion; the breath sounds were markedly diminished over the whole of the left side of the chest, and resonance was slightly increased.

From the story and the physical signs Cammock concluded that the object, described as consisting of a

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(8) Lancet, Lond., Jan. 3, 1920.
(9) Brit. Med. Jour., May 1, 1920.

wooden mouthpiece, with elastic balloon attached, was in the upper part of the left bronchus. No skiagram was taken.

Under chloroform anesthesia a Brüning's tube passed through the glottis showed the mouthpiece of the balloon about three-quarters of an inch below the bifurcation of the trachea, in the left bronchus, with the balloon folded between the mouthpiece and the spur of the bifurcation. Cocaine and adrenalin were applied to the spur and to the left bronchus above the object, which was gently freed with Brüning's spoon forceps, and then removed at the end of the tube with Paterson's forceps. The patient was perfectly well and the lung appeared quite clear in four days.

The wooden mouthpiece was 1¼ inches long, 3/16 of an inch in diameter, and slightly expanded at either end. The fabric was more than twice the length of the mouthpiece, but being very thin occupied little space.

Veil Pin in Bronchus. While dining in a restaurant five days previous to the time G. G. Campbell[1] saw this patient, a small bead-headed pin became dislodged from her veil, falling between the veil and face into the mouth. A sharp pricking sensation in the throat caused her to inhale quickly and the pin was lost. Following this, the patient had no symptoms, but feeling anxious, consulted her family physician two days later. Examination of the pharynx and larynx was negative, and there were no signs of bronchial irritation. On the third day, the patient developed a slight cough with a sensation of constriction in the neck immediately above the sternum. On drinking water the sensation disappeared. In the evening a paroxysm of coughing occurred accompanied by a sense of suffocation. She ran into the street for fresh air and again the symptoms subsided. The fluoroscopic screening (confirmed by the developed plate) showed the shadow of a pin about two inches long with a round head the size of a small pea lying in a branch of the right primary bronchus, the point directed upwards. Under fluoroscopic control, the bronchoscope was brought into relation with the shadow, and alligator forceps

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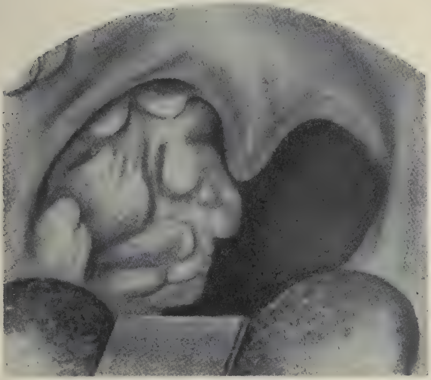
(1) Canadian Med. Jour., April, 1920.

PLATE XV.



Lymphosarcoma of tonsil.—Watson-Williams, page 325.

passed through the bronchoscope were guided to overlie the pin which was readily grasped and withdrawn.

Plaster of Paris in Throat. J. P. Edwards[2] relates the case of a woman who swallowed a piece of plaster of Paris while a dentist was making an impression for teeth. It was too large for the patient to swallow and lodged about one inch below the cricoid cartilage of the larynx. It had been in her throat about seven hours when Edwards saw her and he at once had her anesthetized and with an esophageal dilator located the plaster about seven inches from the upper teeth and made several attempts to remove the body with forceps. He could get hold of it, but was afraid to use much traction not knowing the shape of the plaster, and was afraid of rupturing or tearing through the walls of the esophagus. Therefore he made an incision on the left side of the neck, beginning on a level with the cricoid cartilage and down to the clavicle in front to the sternomastoid muscle, cutting through the platysma and fascia; with a dull separator he pushed the sheath of bloodvessels forward and avoided cutting any muscles or nerves. With his finger he separated the deeper tissues until he felt the object through the walls of the esophagus and then manipulated the body until he felt it turn over, using a little traction, pushing it farther up and with a pair of forceps in her throat engaged the plaster and with some manipulation dislodged it, extracting it through the mouth. The piece of plaster was of irregularly triangular shape, 1¼ inches long, ¾inch wide, ½ inch thick.

THE PHARYNX.

Pharyngospasm. Spasm in the pharynx is liable to be induced by some insignificant lesion is the claim made by E. Weill.[3] It does not cause spontaneous pain but the patients, usually children, refuse to eat. This may keep up for weeks or months, with transient intermissions. The child seems to lose the notion of eating.

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(2) Kentucky Med. Jour., April, 1920.
(3) Paris méd., Dec. 6, 1919.

He is not only seldom hungry, but he seems to have forgotten all about eating. He accepts food and chews a mouthful, but does not swallow it, chewing it over and over. The spasm conditions resemble those of erosion of the anus. In Weill's cases the children were from 19 months to 9 years old. Sometimes catheterization breaks up the spasm at one sitting. Other cases may require two or three sittings with a few days' interval. Weill uses Bouchard rubber sounds, dipped in boiling water and then in glycerine, for the progressive dilatation. The child is then able to swallow at will. The spasm can also be combated with a cold water compress to the throat for thirty or forty minutes, and then massaging the throat. If the child shrinks from swallowing, the finger pressed on the trachea causes suffocation which starts a swallowing movement. These measures are not so certain as the sound. With a neuropathic tendency, success is sometimes attained by having a stranger feed the child, and sometimes it will soon be swallowing normally. In three cases the children had become so much debilitated that murmurs suggested heart disease. The children held the mouthful of fluid in the mouth and then let it drool away. They were convalescing from typhoid, and minute ulcerations were visible on the posterior wall of the pharynx. Weill touched the throat with cocaine and compelled these children to swallow fluid in abundance, and all the symptoms subsided.

Pneumococcus Ulceration of Pharynx. After having suffered with severe headache for a week, B. Foster's[4] patient developed stiffness and soreness of the throat, which swelled inside, preventing him eating. Liquids returned through the nose. After six weeks in hospital the condition had improved sufficiently to enable the man to eat in comfort, but in another three weeks the symptoms recurred. He was suspected of diphtheria while in hospital and seven swabs were taken at intervals for examination. Each time the report was negative. Wassermann test gave a negative response. The condition has persisted with many short intervals, when he has been almost free from symptoms and the ulcers almost

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(4) Med. Jour., Australia, Sept. 27, 1919.

healed, only to break out afresh, with a return of deep serpiginous ulceration.

There is now extensive destruction of the faucial pillars and of the mucous membrane of the pharyngeal wall. These areas have been replaced by scar tissue. There are, further, several deep linear ulcers in an active state. The area of the posterior pharyngeal wall affected extends well up into the nasopharynx and below to the level of the epiglottis. The condition has now persisted for over two years, and shows no sign of clearing up. Various treatment has been tried without benefit, *i.e.*, vaccines, swabbing the pharynx with *liq. arsenicalis*, solutions of silver nitrate, zinc sulphate, iodine, etc. A vigorous course of antisyphilitic treatment was given without apparent effect. Cultures made on several occasions showed the pneumococcus constantly present in almost pure culture.

TONSILS AND ADENOIDS.

Leukocyte Count in Chronic Tonsillar Infection. A tabulation of two hundred consecutive cases is presented by J. M. Walsh[5] which demonstrates that a definite leukocyte increase occurs in chronic tonsillar infection. Cases were classified as having a leukocytosis only when a persistent white-blood count of over 10,000 was found. The highest white-blood count at the time of operation was 38,000. There were twelve with a count of 25,000 and above. The average leukocyte count for the series was 16,700. The postoperative count showed in every case to be under 9,000. There were but five postoperative counts above 8,000; and these all in children under ten years of age. The average postoperative count in the series was 6,500.

Experimental Streptococcus Tonsillitis. The apparent inefficacy of streptococcus vaccine as a prophylactic is really the basis of DeW. G. Richey's[6] paper. This report deals with the occurrence of sixteen cases of tonsillitis, due to infection with secretions from the sick,

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(5) Journal-Lancet, Dec. 1, 1919.
(6) Jour. Infect. Dis., October, 1919.

which developed during the course of some experiments on human volunteers, conducted by medical officers of the U. S. Navy and U. S. Public Health Service, in an attempt to ascertain, if possible, the mode of dissemination and cause of influenza. Save for the occasional incidence of hypertrophic tonsils, the 155 men were in excellent condition. The histories revealed the fact that they had enjoyed good health, some never having been ill. Less than 10 per cent. had experienced repeated attacks of tonsillitis and none had suffered from "sore throat" for several weeks before the experiments began. Of these men 226 inoculations were made, of which 124 consisted in the transference of crude nasopharyngeal washings and bronchial secretions from certain individuals presumably ill of influenza into the noses and throats of eighty-six different men. Sixteen of these men developed tonsillitis. Only two showed hypertrophic tonsils before inoculation. No volunteer receiving filtered secretions showed a subsequent throat condition. The cases of tonsillitis were clinically typical. All exhibited more or less purulent exudate in the crypts of one or both tonsils at some stage of their illness. They all made an uneventful recovery, except one man who developed a right-sided otitis media which proceeded to recovery.

In every case a hemolytic streptococcus was found to be the predominating organism in the cultures taken from the tonsils in the early stages of illness, and it was noted that on the fresh, human blood-agar plate the colonies were very similar to those seen in the cultures from the donors of the respective groups. All corresponded to the "beta" type of Smith and Brown, and Smillie. No difficulty was occasioned in cultivating them, aërobically, on human blood agar (5 per cent.) and serum broth. Those cultures from donors and recipients which were transplanted to carbohydrate mediums fermented lactose and salicin with the formation of acid, corresponding to *S. pyogenes* in Holman's classification.

Three of the cases of tonsillitis developed in persons who had received, one month previously, a vaccine containing, in addition to other organisms, three presumably adequate doses of hemolytic streptococci.

Lymphosarcoma of Tonsil and Palate. The value of a radical operation in even somewhat advanced cases of some malignant neoplasma of the tonsils and palate appears exemplified in the case cited by P. Watson-Williams[7] (Plate XV).

A man aged 36, had a large sarcoma originating in the right tonsil and involving the soft palate and the palatal pillars on his right side. The glands in the neck below and behind the right lower jaw and beneath the sternomastoid were considerably enlarged. The patient had noticed the enlargement for five weeks only, but it had increased very rapidly.

A portion of the growth was removed and proved to be a lymphosarcoma.

The right external carotid artery was ligated and the enlarged glands in the neck carefully and completely removed. The tonsillar growth, together with the palatal pillars, and the right half of the velum were removed, including the uvula. The previous ligation of the external carotid artery rendered this operation almost bloodless.

Eleven months after the operation the patient had increased in weight and had no discomfort. There was no sign of recurrence in the throat or in the glands of the neck.

Tonsil in Relation to Infectious Processes. Lymphoid structures attain two maxima of distribution: one in the throat and another in the region of the ileocecal valve and appendix; these maxima correspond in general to the normal distribution of bacteria in the alimentary canal. At these points also the greatest number of pathogenic microörganisms attack the body. Plasma cells appear shortly after birth (therefore after infection) under the mucosa, and their presence probably indicates chronic absorption of infectious and other material.

D. J. Davis[8] claims that certain organisms injected into the crypts of the tonsils disappear in a few days. The flora normally found in the tonsils is a restricted one. Actinomyces-like granules, composed of fusiform

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(7) Bristol Med.-Chir. Jour., March, 1920.
(8) Jour. Amer. Med. Ass'n., Jan. 31, 1920.

bacilli, streptococci and spirochetes growing together, appear as more or less normal inhabitants of the crypts. Here may be an important source of *B fusiformis* in certain infections about the mouth caused by this organism. In the tonsil crypts, *Streptococcus hemolyticus* is almost constantly found. This focus is one source of these organisms in the throat and adjacent structures. This fact must be considered in making throat cultures and in a study of the problem of hemolytic streptococcus carriers.

Apothesine Anesthesia in Tonsillectomy. In thirty additional cases in which J. Coleman[9] removed tonsils under adrenalin and apothesine anesthesia the anesthesia was always perfect and invariably lasted more than two hours. This anesthetic does not interfere with primary healing of wounds. There was a consistent absence of sloughing. Hemorrhage in these patients was negligent. For the most part it consisted only of slight oozing but the field of operation was never obscured. This of course was due to the vasoconstrictor action of adrenalin. As between apothesine anesthesia and general anesthesia for the operation of tonsillectomy in an adult, Coleman says that in the light of our present knowledge of local anesthetics and local anesthesia it is difficult to find justification for the use of a general anesthetic and the subjection of the patient to its concomitant inconveniences and possible dangers.

[We have used apothesine extensively for the removal of the tonsils and find it apparently as satisfactory as novocain but not any better. Either of the two forms the ideal anesthetic for tonsillectomy in adults. We have not been in the habit of using adrenalin with the injection. General anesthesia for tonsil operations is not recommended in adults. The danger is much greater and the discomfort is greater than when using a local anesthesia.—Ed.]

Advantages of General Over Local Anesthesia in Tonsillectomy. This paper by H. M. Becker[1] has a twofold purpose: (1) A discussion of its title and (2) a means of bringing into rhinologic literature a fatal case

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(9) New York Med. Jour., July 5, 1919.
(1) Penn. Med. Jour., February, 1920.

of novocain anaphylaxis. The advantages of general over local anesthesia may be stated, *viz:*

	General	Local
1. Hemorrhage	Less	More
2. Shock, mental	Less	More
3. Shock, surgical	Less	More
4. Faucial	Complete removal	More chances for incomplete
5. Pharyngeal	Complete removal	Never complete
6. Trauma, muscular	Less	Trauma, muscular, more
7. Trauma, blood-vessels and nerves	Less	More
8. Adherence of pillars	Less	More
9. Resulting scar tissue	Less	More
10. Safety of anesthetic	More	Less

The fatality from novocain anesthesia occurred in a patient, aged 25 years. The anesthetic used was a freshly made sterile solution of 0.3 per cent. novocain, as it was at that time called, to which fresh, 1 to 1,000 adrenalin chloride was added, 10 drops to the ounce. A sister of the patient was operated on first. Three drams of the 0.5 per cent. novocain solution were poured out of the sterile glass stopper bottle into a sterile cup. About 2.5 drams were injected around the tonsils, both superficially and one deeply behind the tonsil, according to Becker's usual custom, the points of injection being selected in accord with the location and course of the nerve supply. Without incident a clean and painless enucleation was accomplished, unattended by either operative or postoperative hemorrhage. No toxic symptoms were present during or after operation. The entire procedure consumed about fifteen minutes. She was returned to her room.

Then the patient was brought by the returning nurse. All tight clothing had been removed. An entire change of sterile linen, instruments, gowns, etc., was made. Into another sterile cup 2 drams of the novocain solution were poured from the same bottle. No change had been made in the solution. About 100 minims were injected in the same manner and at approximately similar points as at previous anesthetizing of her sister. In about three minutes after the last injection and before any operative procedure was or could be begun, a slight convulsive movement involving only head and neck was noticed, followed in a few seconds by a more severe and extensive one, including shoulders and possibly chest and upper arms. These were almost immediately followed by more violent attacks, so that the fifth or sixth resembled in its general character the violent leaping of a frog, with resulting overturned chairs and stools. Tightly holding her about the waist, Becker succeeded in putting her on her back on the floor, from which a nurse and he at once found themselves lifted, and were not able to prevent a violent head-bumping. Tightly closed jaws, some frothing at the mouth, slight biting of the tongue, dilated pupils, fixed globes, wide palpebral fissures, excessive lachrymal flow, stertorous breathing, moderate but soon marked cyanosis, passing of the violent convulsive seizures into a marked and general tremor, with occasional jerking of one or the other foot, flexion of the forearm on the arm, legs not flexed on thighs, thumbs tightly pressed into the palms, simulated somewhat an epileptic seizure. Cardiac action was not materially abnormal, except in rate, reaching in several minutes 120. Respiration ceased after several minutes, preceded by prolonged expiration, and with a regular but rapidly decreasing volume of air. Artificial respiration had been begun immediately on the cessation of respiratory effort, with oxygen, atropine, rectal dilatation and infusion, heat, posture, in fact all within the combined knowledge of two consultants, five nurses and Becker, was done. All these efforts were fruitless. Respiration ceased in not more than ten minutes from the beginning of the convulsions. The heart could be heard distinctly for three hours, and by gradual reduction became inaudible at the end of another half hour.

[The conclusions expressed in this paper are so at variance with our own after several years of extensive use of local anesthesia that we give our own conclusions:

1. Hemorrhage is much less under local anesthesia and what bleeding occurs is more readily controlled with the patient awake.

2. Mental shock under local anesthesia is quite neg-

ligible, except in unusually nervous patients. For such cases give the general anesthesia.

3. Surgical shock is much less under local anesthesia when properly administered.

4. A cleaner operation is possible under local anesthesia than with the patient asleep.

5. An adenoid operation is rarely required when the local anesthesia is employed, *i. e.* in adults.

6. Trauma is much greater when using general anesthesia.

7, 8, 9. There is no special difference in the two methods.

10. We believe there is no doubt that the local anesthesia is much the safer method.

As regards the fatal case here reported: We have used novocain in over a thousand cases and never once noted any general toxic symptom. We suspect that the accident in this case may have been caused by injecting air into a blood-vessel. Experience with novocain does not warrant the conclusion that the symptom was the result of a toxic action of this substance.—Ed.]

Gas-Oxygen Anesthesia in Tonsillectomy. E. I. McKesson[2] claims that the advantages of gas-oxygen in this operation are numerous and important. A suitable apparatus and an anesthetist skilled in its use are essential. The patient is placed in a suitable dental chair with foot rest removed, or in a Denman chair.

The operator sits directly in front of the patient on a low stool, then the chair is raised until the patient's mouth is slightly above the level of the surgeon's eye, the back rest is brought forward enough to make the patient lean slightly forward so that any blood will run out of the mouth. The nasal inhaler is applied and secured with elastic head gear, the breathing tube attached and pure nitrous oxide is delivered to the inhaler under very slight pressure to make breathing very easy. This is important, especially where adenoids obstruct the nose materially.

At the psychologic moment, or at the third breath when the gas has made the patient confused, the surgeon commands him to open the mouth; the Whitehead gag is in-

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(2) **Canadian Med. Quarterly, February, 1920.**

serted and the mouth immediately covered with a wad of gauze to prevent the inhalation of air. Consciousness is lost about the fifth breath, which is characterized by a slight stertor and alteration in the character and rythm of respiration. This is the cue for the addition of 5 per cent. oxygen with the gas. While consciousness has been lost, still deeper anesthesia is needed before beginning the operation and the patient's proper mixture of the two gases must be determined, which should occupy from one to two minutes.

[We do not see the advantage of hurrying through the tonsil operation, which is necessary when gas is employed. In many cases, especially where the tonsils have become adherent through peritonsillar infiltration, careful, painstaking dissection is necessary. The position is a serious objection in administering general anesthesia because of the danger from inhalation, pneumonia and lung abscess.—Ed.]

Clinical Indications for Enucleation of Faucial Tonsil. There are four local conditions which M. Quackenbos[3] says indicate enucleation: (1) New growth, (2) the tonsillotomy operation, (3) recurring acute inflammations, (4) hypertrophy associated with Eustachian or nasal obstruction. To these may be added the persistent diphtheria carrier.

Three reflex conditions warrant enucleation, particularly if on inspection faucial hypertrophy is present: (1) Cough due to an enlarged lingual tag, (2) nocturnal enuresis in the absence of acid concentrated urine, (3) *petit mal,* or meningism. Any acquired palsy in childhood (precluding hysteria) is an indication.

Quackenbos believes that the excellent results of enucleation reported in poliomyelitis clearly demonstrate that in such cases the patients are suffering from post-diphtheritic paralysis. Excellent results accompany enucleation when the child is suffering from chronic otorrhea or middle ear deafness.

No operation on cleft palate, in Quackenbos' opinion, is justified after the age of 18 months unless the tonsils have previously been removed, their presence being one of the unmentioned causes of failure. Perhaps the most frequent indication for enucleation is cervical adenitis. Any proposed operation for excision of the glands of the neck should be preceded several weeks by the tonsil enucleation and head-fixation with a suitable splint. Of the operations designed for the complete removal of the tonsils, the dissection method of Mr. George Waugh stands paramount in Quackenbos' opinion.

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(3) Med. Record, April 17, 1920.

In Quackenbos series of 900 cases by Waugh's method there has been no instance of postoperative hemorrhage, all oozing being stopped before the patient leaves the table. In seventy cases Quackenbos applied plain catgut No. 2 to the bleeding point caught by an ordinary six-inch artery forceps to achieve this end. It is rarely necessary to remove the posterior inferior turbinates.

The postoperative treatment consists of a gargle of 1 per cent. chloramine-T, with small doses of ferric iodide, and correction of the mouth-breathing habit, if present, by exercises in the prone position.

The dangers and complications are slight. Two children developed bronchopneumonia, and two with chronic discharging ears required a mastoid operation a few days later. Five adults developed unilateral acute otitis media, and in three of them incision of the drum was required.

There were two deaths: one from an overdose of chloroform; the other patient was operated on for acute mastoiditis superimposed on chronic otorrhea of many years' duration, and on the third day showed intracranial pressure symptoms, without localizing signs; postmortem examination revealed a cerebellar abscess.

Technique of Tonsillectomy. The object of the operation described by W. Bishop,[4] is to remove the tonsil from the fossa with a minimum of injury to the anterior and posterior pillars. The initial incision extends along the free margin of the anterior pillar in its entire length, cutting through the plica tonsillaris, which spreads over the edge of the pillar on to the face of the tonsil. The plica having been cut through, the edge of the scalpel is slipped under the edge of the anterior pillar, between it and the capsule of the tonsil, penetrating to a depth of one-half inch; then by a

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(4) Journal-Lancet, Dec. 1, 1919.

sweeping excursion of the scalpel the pillar is separated from the capsule. The incision having been made, the anterior pillar is retracted outward with the retractor, exposing to view the glistening capsule of the tonsil. This is grasped firmly in the tonsil forceps, care being taken to include the uppermost portion. The forceps once applied should not be removed until the operation has been completed. The tonsil, having been firmly grasped in the forceps, is now pulled downward and forward toward the center of the mouth. The dissector is inserted into the wound, and by a sweeping excursion made to follow the contour of the tonsil, separating it from its connective-tissue anchorage. Reaching the top of the tonsil, the dissector, still hugging the tonsil, is pushed backward and downward following the contour of the back of the tonsil, and incidentally separating the delicate posterior pillar from the capsule. This movement requires delicacy, as the posterior pillar is easily torn. Figure 30 depicts the sites where tonsil remnants are found most frequently following an incomplete operation.

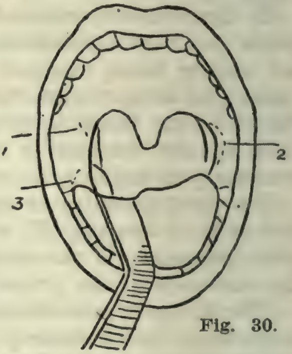

Fig. 30.

Retention of Part of Tonsil in Tonsillectomy. H. C. Masland[5] has for some time advocated the retention of a shallow layer of tonsil and of course the capsule. Some crypts will remain, but they are shallow and usually return to health. Occasionally, it is necessary to give them further attention, in which case a wedge-shaped piece removed from their length will suffice. The absence of the greater degree of unyielding cicatricial tissue that forms when the capsule is removed, has appealed to him. Scar tissue is as pernicious in the fauces as anywhere else in the body. Masland admits that there are cases in which a complete enucleation is advisable. He pleads for the skillful removal

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(5) New York Med. Jour., Aug. 16, 1919.

of the major portion of the tonsil in most cases and the removal of tonsil and capsule in a small minority.

[This plea for the removal of the tonsil, leaving the capsule, is more justified in theory than in practice. A small fragment of tonsil left is very often the source of ensuing infection and tonsillar abscess.—Ed.]

Results of Tonsillectomy in Myositis and Arthritis. The results in two hundred consecutive cases are recorded by H. I. Lillie and H. R. Lyons.[6] Seventy-one (81.6 per cent.) of the first group of eighty-seven patients were better after tonsillectomy; the others were not improved. Eighty-eight (77.7 per cent.) of the second group of 113 patients were better after tonsillectomy; the others were not improved. These percentages indicate that as the condition becomes more chronic less benefit is derived from tonsillectomy, although in the long standing cases improvement is found almost as often as in the recent or subacute cases. The average age of the patients who reported their condition worse was forty years. The duration of the myositis or arthritis in all cases varied from a few days to thirty-nine years. The average duration of the myositis or arthritis in patients improved by tonsillectomy was eight years.

The ten patients in whom the condition was chronic and who were invalids at the time of operation report results as follows: Two patients who were confined to bed were the same after tonsillectomy. Four walked but were incapacited for work; ultimately two of these were better. Two were wheel-chair cases; one was better and one the same. Two had had to use crutches; one was better and one was not improved. Thus four of the ten patients (40 per cent.) reported improvement. In the cases of arthritis, the joints involved in the order of frequency were the knees, the hands, the ankles and the hips. In the cases of myositis, the shoulders and arms, the back, the lower extremities and the neck were involved.

In the cases of pyorrhea alveolaris or tooth abscess, demonstrated both clinically and by the Roentgen ray, 81.4 per cent. of the patients were better after tonsil-

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(6) Jour. Amer. Med. Ass'n., April 26, 1919.

lectomy; 36 per cent. of these had dental work done in addition to tonsillectomy, and 45.4 per cent. had no dental work done; 18.6 per cent. of the patients were the same after tonsillectomy; 12 per cent. of these had dental work done in addition to tonsillectomy, and 6.6 per cent. had no dental work done. One hundred and fifty-four of the 200 patients were unable to work, or at least were unable to work steadily at the time of their examination. After tonsillectomy, 118 (77 per cent.) of these were able to work steadily; thirty-five (22 per cent.) were the same postoperatively. Thirty-five patients of the series needed the help of crutches or a cane. Twenty-five (71 per cent.) of these were enabled by the tonsillectomy to discard any help; ten (29 per cent.) were not benefited. Twenty-four (12 per cent.) of the patients reported an acute exacerbation of their condition immediately after the tonsillectomy. Nineteen (79.1 per cent.) of these reported ultimate improvement; five were not improved. Of 159 patients who reported that they were better, eighty-seven (55.3 per cent.) reported that their improvement started immediately after the tonsillectomy; the average length of time before improvement began was eight weeks. Ninety-two of the 200 patients had enlarged joints. Of these, fifty (54.3 per cent.) reported that their joints had returned to normal size after tonsillectomy, and 45.7 per cent. reported that their joints had remained the same.

Thirty-three of the patients had had treatment other than tonsillectomy, for example, massage, baths, electric vibration, vaccines and osteopathy. A special study was made of twenty-eight selected patients who had a most severe form of chronic infective arthritis with marked involvement of the joints. The average age of the patients was 37 years; the duration of arthritis was from ten months to eight years; the average duration of arthritis in those who were improved was eight years; the duration in those who remained unimproved was from eight months to twelve years. Sixteen (56.1 per cent.) reported their condition better, and twelve (42.9 per cent.) were not improved. Seventeen of the patients were aged 31 years or more, of whom nine (53 per cent.) were better postoperatively, and eight (46.3 per cent.) were not improved. Eleven were aged 30 years or younger, of whom eight (72.7) were better after operation, and four (36.6 per cent.) were not benefited.

Most of the patients in the series of 200 cases who did not obtain relief from tonsillectomy fall into the group of the long-standing, chronic cases, and in cases in which the arthritis was not improved after operation, six times as many of the patients were of 31 years or more as were of 30 years or less. Even in the group of the severe type of arthritis, 53 per cent. were of the older patients. Seventy-two and seven-tenths per cent. of the younger patients in the group were markedly improved. Twenty-one of the twenty-eight patients were disabled or unable to work at the time of examination. Eleven (52.3 per cent.) of these reported that their condition was improved and that they were able to work; the other 47.7 per cent. were still incapacitated. Five (31.2 per cent.) of the eleven who were improved reported that their improvement started immediately following the tonsillectomy. The average length of time before improvement was noticed was three months. Twenty-two of the twenty-eight patients had enlarged joints before tonsillectomy was performed. Of this number, six (27.2 per cent.) reported that their joints had returned to normal size; the others reported no change. Six (21.4 per cent.) of the twenty-eight patients reported an acute exacerbation of the joint signs and symptoms immediately following tonsillectomy. Three of these eventually reported improvement; the others were not improved.

Eleven (39 per cent.) had some form of dental work done in addition to their tonsillectomy. Nine (81.1 per cent.) reported their condition better; two were not improved. It may be assumed that many of these patients retain teeth that are acting as a focus of infection, and that a higher percentage of improvement would undoubtedly be reported if the Roentgen ray were employed, and a careful examination were made in every case, so that all dental sepsis might be removed promptly and thoroughly.

[The indiscriminate removal of tonsils in persons suffering from chronic myositis and arthritis, irrespective of the local evidence of tonsil disease, is sure to show a large percentage of cases unimproved.—Ed.]

Delayed Postoperative Hemorrhage Following Tonsil and Adenoid Removal. To find bleeding from the nasopharynx in the adenoid region commencing again after twenty-four hours following the operation is comparatively uncommon. The case reported by E. V. Hubbard[7] shows the need for keeping in mind the possibility of late nasopharyngeal hemorrhage.

A girl, 8 years old, had her tonsils removed by the Sluder method, and adenoids with the Brandegee forceps and curette. There was only a moderate amount of adenoid tissue. During the operation, and subsequently, there was rather less than the usual amount of bleeding. The patient left the hospital, with uneventful recovery, at the end of two days. Inspection of the throat a few days later showed healing of tonsil areas. No adenoid tissue remained in the nasopharynx, and nasal breathing had become entirely unobstructed. The patient returned to her home, out of town.

The tenth night after the operation, the child meanwhile having progressed normally, a profuse gush of blood from the mouth and nose wakened her from sleep. The hemorrhage continued and a large quantity of blood was lost. Applications of ice, peroxide of hydrogen, and adrenalin failing to check the hemorrhage, a posterior nasal plug was introduced. The patient was almost pulseless, but retained consciousness. An intravenous saline infusion, 250 c.c., was given. Two hours later the pulse was 160, temperature (rectal) 100° F. Half a pint of saline solution was introduced into the rectum and retained. Strychnine sulphate, 1/60 of a grain, was given hypodermatically every four hours. Improvement continued. The following evening the nasal plug was removed and the strychnine discontinued. Calcium lactate, 15 grains, at four hour intervals, was ordered. A careful inspection of the throat showed no change in the tonsil areas. They

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(7) Med. Record, May 15, 1920.

appeared entirely healed and normal. The bleeding had been wholly from the nasopharynx.

The subsequent history is negative, there being no further hemorrhage, and the patient slowly recovering.

[Postoperative bleeding after tonsil operations we have seen as late as the tenth day. Most of the cases occur about the fifth or sixth day. Patients on leaving the hospital should always be warned of this possibility and given directions to be followed should such occur.—Ed.]

Hemorrhage Complicating Tonsillectomy. During the past twelve years V. Dabney[8] has had under his care only four cases of secondary hemorrhage delayed beyond twenty-four hours after operation for removal of the faucial tonsils. Of these number the first two were done under cocaine infiltration, without adrenalin, with the Mackenzie tonsillotome; the last two under ether and with the cold snare.

It is Dabney's belief that the cause of these secondary extravasations when thus delayed can not be definitely stated, but it seems reasonable to assume that in some instances the explanation may lie in the separation of a slough, which forms in all cases to some extent, especially where there has been much trauma. Where this slough involves vessels its separation might readily cause some hemorrhage. Again, exertion resulting in increased force in the blood stream against the walls of small vessels thinned at operation, might cause the flow of blood through rupture of the thinned areas. A tuberculous or syphilitic taint would enhance this possibility, of course.

Unusual Case of Hemorrhage from Tonsillectomy. In the case cited by H. L. Whale[9] the left tonsil shelled out easily, quickly and almost bloodlessly. On the right side, as soon as the upper half of the tonsil had been separated from its bed, copious bleeding began. This welled up from the extreme depths of the fossa, from a point entirely concealed by the anterior pillar, and from about half-way up the fossa. In color the blood was arterial; an inability to detect pulsation may have been due to the depth of the bleeding point. This was probably

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(8) Ann. Otol., Rhinol. and Laryngol., September, 1919.
(9) Brit. Med. Jour., May 24, 1919.

either the tonsillar branch of the facial artery, or a tributary of the pharyngeal venous plexus. Artery forceps failed to control the bleeding. Wagner's clips failed to grip the posterior faucial pillar; perhaps this was due to spasm of the palato-pharyngeus, for the patient was by now only lightly anesthetized, and with the pharynx constantly and rapidly refilling with blood it was both difficult and dangerous to keep her under. With a cleft-palate needle three sutures were passed through anterior and posterior pillars, and these were sewn together over a strip of ribbon gauze; this also failed to stop the bleeding, and with repeated spasm one stitch cut out. A Cullum's clamp was now tightly applied, with temporary success. In order that the patient might tolerate the clamp she was, after removal to bed, kept lightly under morphine. Nine hours later CE_2 was again given and the Cullum's clamp gingerly removed. Bleeding was, if anything, more profuse than before. Swabs and artery forceps were again tried fruitlessly. Cullum's clamp was reapplied while the external carotid was tied at its origin; the clamp was then removed. The possibility of an abnormal tonsillar blood supply was suspected for the following reasons:

1. The common carotid had a high bifurcation—slightly above the hyoid level—and no superior thyroid branch could be seen. It seemed, therefore, likely that other arterial **abnormalities might co-exist.**

2. Occlusion of the external carotid checked the bleeding almost entirely, but, for the moment, not absolutely. For these reasons the possible existence of a tonsillar branch from the internal carotid was surmised; and, as a safeguard, a second ligature was left loose around the common carotid, to be tightened if necessary. The slight residual oozing, however, stopped entirely in a few minutes; and this loop around the common carotid was removed in twelve hours.

[The control of bleeding after tonsil operation often taxes the skill of one who has become an expert in rhinolaryngeal work. This fact alone illustrates the folly of the general practitioner attempting to do tonsil operations.—Ed.]

Tonsillectomy in Diphtheria Carriers. Graham-Smith was the first to suggest that in many instances the removal of enlarged tonsils and adenoids may be of great benefit in hastening the disappearance of the bacilli. Of fifty cases of persistent carriers coming under the observation of G. Brown and E. K. Hughes,[1] thirty-three were admitted for acute diphtheria and the remaining seventeen were admitted as carriers. The earliest period when an operation was performed after admission, was five weeks. All these patients were bacillus-free on an average of fifteen days—some in six days.

During 1919 over 100 tonsillectomies were performed on persistent "carriers" and these gave an average of ten days after operation until the three consecutive negative "swabbings" were obtained. In all the cases the tonsils were enucleated by the "Sluder" method. The nasopharynx was carefully cleared of all vegetations by the La Force adenotome, followed by a simple curettage and scraping with the finger nail. Ethyl chloride anesthesia was used in all the operations.

The average length of time in the pharyngeal cases before coming to operation was 5½ weeks and the average time after giving the three negative "swabbings" was 11.41 days after the operation: Laryngeal cases (5½ weeks before operations) took 14.5 days to clear. Laryngeal and pharyngeal cases (6½ weeks), 15 days to clear. Pharyngeal and aural (7 weeks), 12 days to clear. Pharyngeal and nasal, 8 weeks to clear. Pharyngeal, aural and nasal (6½ weeks), 7 days to clear. Carriers took on an average 14.8 days to clear. The average in the simple carriers was increased by five cases, which took 15, 16, 25, 28 and 42 days respectively to clear.

[Ethyl chloride as an anesthetic should not be used as it has been shown to be as dangerous as chloroform, which, however, we note that the British persist in using for tonsil operations.—Ed.]

Tonsillo-Adenectomy. It is a well known fact that children who have had their tonsils and adenoids thoroughly removed rarely develop mastoiditis. On the other hand, in a large majority of the cases of mastoiditis, diseased tonsils and adenoids have been found to

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(1) Med. Jour., Australia, April 17, 1920.

exist. It is also recognized that a chronic middle-ear suppuration may be in many instances cured by the removal of adenoids or tonsils or both, combining this procedure, if necessary, with local and general treatment. Therefore, during the last two years, O. Glogau[2] has advised the removal of adenoids alone or together with tonsils, where necessary, whenever the discharge from the ear did not stop within three weeks. He has also performed tonsillo-adenectomy as a last resort, in order to give children suffering from acute mastoiditis and showing hypertrophied and diseased tonsils and adenoids a possible chance to escape mastoidectomy. Even if the mastoid symptoms should not disappear after the tonsils and adenoids have been removed, and mastoidectomy has to be resorted to later on, the process of healing and recovery will be speeded up and the recurrence of infection with the necessity of repeated operation will be avoided.

Cases of mastoiditis, in which meningeal or septic symptoms are present and those showing *Streptococcus capsulatus* as the causative germ; furthermore those cases of mastoiditis which complicate infectious diseases, especially measles, and those cases in which distinct necrosis of the bone has been demonstrated by the Roentgen picture, are excluded from this conservative procedure. In these cases the mastoid operation has to be performed immediately. The so-called classical mastoid symptoms, form *per se* no contra-indication for the "tentative" tonsillo-adenectomy.

It is not claimed that every case of even mild mastoiditis will be cured by tentative tonsillo-adenectomy. The suggestion is only made to give the patient a possible chance, to have a major operation substituted by a minor interference. The removal of the diseased tonsils and adenoids may fail to cure the mastoid condition and the symptoms may progress so as to necessitate the exposure and curetting of the mastoid. This can be readily done at the indicated moment, as the patient is kept under strict hospital observation. The previous removal of the offensive lymph tissue will then be a great help toward the quick healing of the mastoid

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(2) Laryngoscope, February, 1920.

wound, toward the prevention of reinfection and possible secondary operation and will bring about a speedier recovery of the patient.

[We agree with the author that otitis media often results from disease of the tonsils and adenoids, and that some cases of otitis media may be favorably influenced by removal of enlarged adenoid and tonsils. We doubt whether an inflammation in the mastoid will be in any way influenced by operation for removal of the tonsils and adenoids.—Ed.]

Adenoid Diphtheria. A girl, 9 years of age, presented distinct pallor, great muscular weakness, listlessness, lusterless eyes, a temperature of 97.6° F very weak and compressible pulse of 160. Her ailment began two days before E. Lee Myers[3] saw her when she had been sent home from school by the nurse. Two weeks previously, she had had pneumonia but apparently had completely recovered. The mother immediately recognized a temperature of 103.5° F; the family physician who was called at nearly midnight was unable to make the proper throat examination, but the following morning noticed that the throat was reddened and the nose somewhat occluded. The patient's mother states that at this time the child had a watery secretion from the nose, and there was some nausea. The mother also inspected the throat and saw strings of mucus in the roof of the mouth. The following day the child had no fever but some nausea was present. She seemed very much depressed both mentally and physically. When Myers saw the patient postnasal examination showed the vault of the nasopharynx to be filled with a yellowish white, thin membrane apparently covering what appeared to be an adenoid growth of immense proportions. Antitoxin, 10,000 units, was given immediately. No other medication was used except a nasal instillation of 0.5 per cent. phenol in aqua mentha piperitae to prevent possible otitis media. At midnight, just twelve hours after the antitoxin examination, a postnasal examination with the postnasal mirror showed the postnasal space to be absolutely clear of any membrane, although the child had now a temperature of 104° F and pulse

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(3) Jour. Missouri State Med. Ass'n., January, 1920.

of 120. The following morning the temperature was normal and pulse 90. Myers then reported the case to the health authorities as diphtheritic adenoiditis, notwithstanding a series of negative Klebs-Loeffler cultures from the nasopharynx were obtained while the child was convalescing from the disease.

This case brings out an important point, *viz.,* that a case may clear up in its nasal aspect so far as the diphtheria is concerned and the adenoid growth might be the only seat of the infection; a low temperature (97.6° F) with a rapid pulse (160) shows a toxemia, taken in connection with the physical depression, plus the finding of a membrane in the nasopharynx undoubtedly points to diphtheritic infection of the adenoid tissue.

Nasal Drill in Treatment of Adenoids. G. H. Hickling[4] describes the procedure she pursues at the Manchester Children's Hospital.

The children stand in rows with as much space as possible between each individual in a room with widely opened windows. Each child is given a piece of soft paper to serve as a handkerchief. Then at the word of command:

One: All stand erect (chest out, shoulders back, etc.).

Two: Hold paper ready (spread out in the left hand beneath the nostrils).

Three: Grasp the top of the nose (between the eyes, with the right thumb and forefinger, the elbow being raised to shoulder level) *leaving the nostrils open.*

Four: Blow down the nose (bowing the head forward and down and at the same time depressing the right elbow to the waist line, the top of the nose still being held).

Five: Breathe in.

Exercises three, four, and five are then repeated in a rhythmic manner about ten times, the action somewhat resembling that of a pump. After this each nostril is "pumped" separately in the same way, each side being held closed in turn. The soiled paper, which catches the discharge as it flows unimpeded from the uncompressed nostrils, is now burned and replaced.

The nose and its accessory sinuses having been to some extent cleared by this preliminary pumping, irrigation of the nasal cavity from above down is now obtained by means of a free flow of lymph induced by sneezing, thus: A mild, non-irritating nostril snuff is handed round, containing menthol and a soap basis. Each child takes a pinch of the powder, and lightly flicks the septum just within the nostrils. The powder is not sniffed up. This feeble stimulation is sufficient in the majority of cases to induce a sneeze. Immediately after sneezing "nose pumping" is resumed. Sneezing and pumping may then be repeated until discharge from the nostril ceases or becomes scanty. Lastly, nose breathing exercises are performed, the nostrils being used alternately and together.

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[4] Brit. Med. Jour., Jan. 31, 1920.

The importance of nose breathing and of regular daily nose "toilet" is constantly emphasized, and powder is provided for the drill to be carried out at home.

Results. Improvement in the physique of the class was soon noticeable; the carriage is better, chests are fuller and shoulders less curved, mouths gape less, and there are fewer cases of sniffling and running noses. Mothers report greater freedom from colds, less restless sleep, and cessation of snoring. Speech is clearer and hearing more acute. One child got through the winter without having his "annual" February attack of bronchitis. No member of the class contracts influenza during either of the two epidemics, although in some cases other persons in the household had the disease. Improvement of appetite and of digestion and a gain in weight coincided in several instances with the disappearance of the nasopharyngeal discharge. One case of relapse after operation is now free from symptoms.

With the exception of a diminution, amounting in some cases to an actual cessation of the nasopharyngeal discharge, very little local change was observed in the throats—that is, the relief of symptoms is out of all proportion to the visible improvement in the local condition. In some cases slight shrinkage seemed to have occurred, but in no case could it be said that the growths had disappeared.

Tonsil Bayonet. A. Scott Gillett[5] uses an instrument for operating on peritonsillar abscesses for which the following advantages are claimed: (1) Ease of

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(5) Brit. Med. Jour., April 3, 1920.

sterilization; (2) the presence of a collar, which prevents the operator stabbing too deeply; (3) the double-edged bayonet which facilitates the conversion of the stab into an incision in either an upward or downward direction

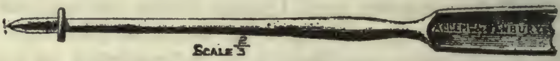

Fig. 31. Tonsil bayonet.

(Fig. 31). The operation can then be completed with blunt forceps quite safely.

New Tonsil Instrument. The tonsil enucleator described by J. G. Rohrig[6] is not a snare, nor is it a cutting instrument or a guillotine. It has a dull blade with an oval-shaped opening. The ring encircling this opening is an incomplete one having a 5 mm. gap in its lower part, as shown at *A* in Figure 32. This gap is hidden, and the ring a complete one when the blade is in the position shown at *B* in Figure 32. By this gap the enucleator may be hooked over the tonsil forceps while the latter keeps its grasp of the tonsil, as shown in Figure 33. The handles are then pressed until the catch on the lower part of the channel supporting the blade is felt to engage the notch on the lower edge of the blade. The ring is now again a complete one encircling the tonsil forceps as in Figure 34.

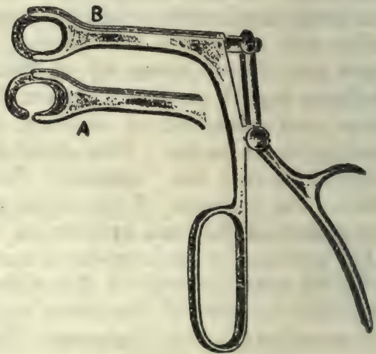

Fig. 32. Tonsil enucleator: *A*, gap for passing over tonsil forceps; *B*, position when gap is hidden and ring is ready for passing over tonsil.

The tonsil being held by a good grasp of the forceps secured before the dissection of pillars is begun, the enucleator is instantly placed in position, as shown in Figure 34. The ring is passed well down behind the

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(6) Jour. Amer. Med. Ass'n., May 22, 1920.

superior lobe of the tonsil while the distal part of the ring is brought well out to include the inferior lobe, or pole. By pressure of the handles the dull blade is moved, and the entire tonsil with its capsule is peeled out with as little injury to blood-vessels and tissues as is possible. The distal part of the blade can be passed well outward to include the inferior pole of the tonsil. The pillars are dissected, the upper and anterior part of the tonsil with the capsule is loosened, the enucleator is applied and placed to include the lower pole, and the operation completed without a second grasp. Even after it is constricting the tissues, the enucleator may be instantly removed from the throat, if it is desired to dissect a pillar. The little dissection may be done, and the enucleator replaced instantly.

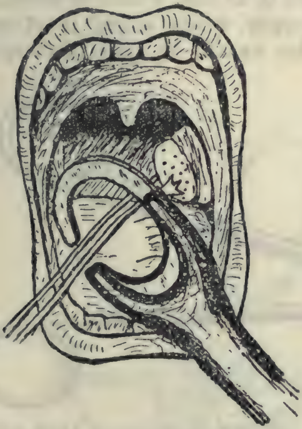

Fig. 33. Tonsil enucleator being hooked over tonsil forceps.

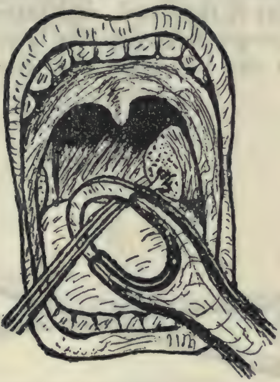

Fig. 34. Completed ring after tonsil enucleator has been placed over forceps: handles are pressed until it is felt that catch has engaged notch.

New Instrument for Ligating Bleeding Blood-Vessels after Tonsillectomy. The instrument devised by J. A. Cavanaugh[7] is similar in shape to artery forceps. On the end of one arm there is a needle about half an inch long; at the end of the other arm is a rounded end, perforated, through which the needle will pass (Fig. 35).

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(7) Jour. Amer. Med. Ass'n., May 1, 1920.

Parallel with the arm and extending beyond the perforating area in this arm is a forklike process with two prongs to form a groove between the rounded part and the fork part for the passage of a thread, which is grasped by the needle as it passes through. On the handle of the perforated blade is a spring for the purpose of placing the threads and of holding them taut, which is very essential. The bleeding area is grasped with artery forceps. One should take the instrument that is threaded, and introduce it as one would a second forceps, to grasp the tissue deeper, make slight traction on the hemostat and allow the needle to pass through the tissue, which, when withdrawn, leaves the thread buried under the bleeding vessel and engaged in the perforated end of the needle.

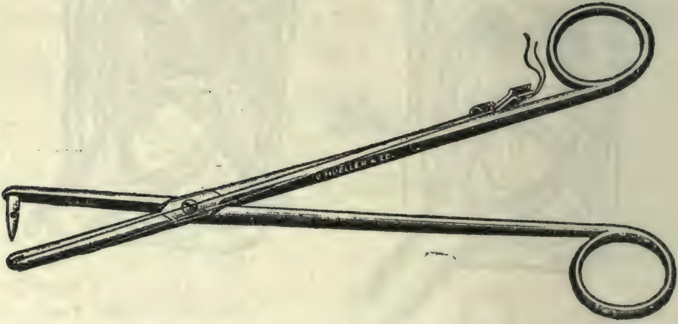

Fig. 35. Instrument for ligating bleeding blood-vessels after tonsillectomy.

As soon as the needle is drawn through with thread attached, the thread in the spring is loosened and the thread will be more easily drawn through. The artery forceps may now be removed, or one may wait until the ligature has been tied.

Tonsillectomy with LaForce Hemostat Tonsillectomes. Before the operation for the enucleation of the tonsil was devised the principle of providing a true hemostat in combination with a tonsillotome was presented to the instrument makers by B. D. LaForce.[8] This was done by having combined parts of two tonsillotomes. Parts of one tonsillotome were shown to represent the hemostat and parts of the other to represent the tonsillotome. The model A instrument (Fig. 36) is well adapted to accomplish the end for which it was devised. The model B instrument (Fig. 37) was devised to accomplish the same results and at the same time have

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[8] (8) Med. Rev. Reviews, January, 1920.

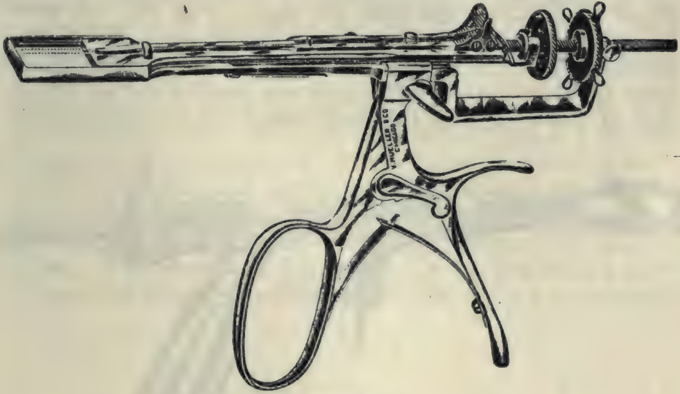

Fig. 36.

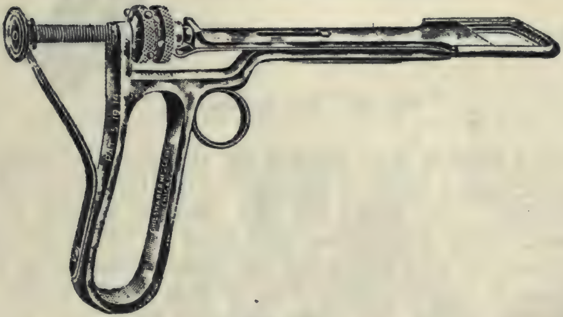

Fig. 37.

the instrument somewhat less complicated. The finger ring on model B gives it a firm grip especially if the middle finger is used in the ring. In each of the models the oblong fenestra is provided. By manipulating the instrument to change the size of the fenestra it can be seen how readily the fenestra can be gauged to fit tonsils of different size. Clinical experience and the ease with which the technique of engaging tonsils or different sizes can be learned with these instruments has proven the utility of having the fenestra made in this shape.

New Instrument for Tonsillectomy. The instrument devised by H. L. Baum[9] is modeled, in general, after the principle of the Mackenzie tonsillotome with the handle at an obtuse angle from the shaft (Fig. 38). A wire is employed, No. 9 piano wire being used, by being threaded into the slide from the sides and pulled down after threading until it fits into the grooves cut on either side of the trough of the instrument. The convexity of the wire loop is then pushed up through the throat of the instrument until it disappears in the groove of the fenestrum. The wires for this purpose should be cut approximately 5½ inches in length as the instrument is so proportioned that when the slide is pushed up until the wire is in position a wire of this length brings the trigger to about the right distance from the handle. The slide should fit tightly enough in the trough of the instrument that it holds by friction after being pushed into position. If it does not it tends to slip back and allow the wire to escape from its proper place.

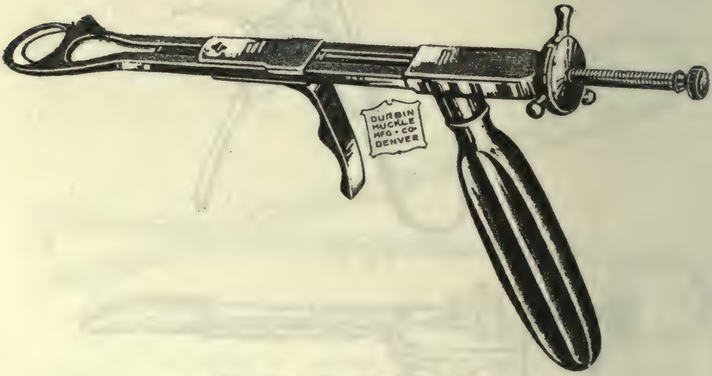

Fig. 38. New tonsillotome.

In performing the operation, no previous dissection is necessary. The instrument is introduced exactly as if

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(9) Laryngoscope, February, 1919.

it were a tongue depressor and the fenestrum *carried* over beneath the lower pole of the tonsil to be enucleated and elevated until the lower pole enters the aperture. The instrument is then rotated through one quarter of a circle, until the remaining portion of the tonsil presents in the opening, and is dislocated anteriorly and slightly externally by a corresponding movement of the instrument. It is usually not a difficult matter to force it through by means of judicious digital manipulation. When the tonsil is found to be entirely through the fenestrum it is fixed in that position by pulling the wire down firmly with the first and second fingers on the trigger of the instrument. If the tonsil is found to be in proper position, the operation is completed by turning down the threaded wheel, thus pulling the slide back and gradually tightening the wire until separation is complete. This can be done as slowly as desired; a slow separation predisposes less to bleeding than a more rapid one.

LARYNX AND TRACHEA.

Cicatricial Stenosis of the Larynx in Children. When the opening for a tracheotomy has not been made in the trachea but through the tissues above, E. J. Moure[1] says, the stenosis can be corrected more easily than where the opening is in the trachea itself. It is better not to attempt this operation on children under 7 or 8 years of age as the passages are so small, and the laryngostomy followed by cleaning out the cavity and consecutive dilatation may entail pulmonary complications. If the stenosis is the result merely of a bad position of the tube, correcting its position may cure the stenosis, which is inflammatory rather than cicatricial. Patience is necessary here, watching over the throat to prevent exuberant granulations around the tube, excising them from time to time and cauterizing with the actual cautery or with 1 per cent. zinc chloride. In time the passage will become permeable, but the tube should never be discarded with-

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(1) **Jour. de méd. de Bordeaux, Feb. 10, 1920.**

out ascertaining with the mirror that the vocal organ is freely permeable. The children have to be trained to breathe through the natural passages, by plugging the tube during the day and, later, at night. There is no need to use special tubes for the purpose. Even if the stenosis is from cicatricial tissue inside the larynx, it can only benefit from the above measures, being in better condition for the correcting operation when the child has reached the proper age. In a case described in a boy of 3, the tube had been introduced just below the thyroid, and the opening had filled up with granulations which had to be excised or cauterized every two weeks for over two years. Then the opening gradually healed, and three years after the tracheotomy had been done, the training of the child to breathe through the natural passages was begun. In four months the tube could be discarded, and several months later the tracheal fistula was closed. The boy is now 10 years old and the larynx and trachea have developed apparently normally.

Angiomas of Larynx. To the fifty-two cases of angioma of the larynx recorded in the literature, G. B. New and C. M. Clark[2] add three cases. Forty-seven cases of hemangioma and eight cases of lymphangioma are included in these cases. The relative incidence of true laryngeal angiomas is small, as indicated by the finding of only three hemangiomas and no lymphangiomas in a series of 217 true laryngeal neoplasms observed in the Mayo Clinic. The symptoms are similar to those of any other benign laryngeal neoplasm, but they vary in intensity according to the size and character of the tumor.

Angiomas of the larynx, when associated with similar conditions elsewhere, may involve the extrinsic structures as well as the intrinsic, but when localized in the larynx are most frequently found in the true and false cords. The macroscopic picture of all true laryngeal hemangiomas is about the same; also all lymphangiomas present a characteristic clinical picture. A microscopic examination is essential to an absolute and accurate diagnosis. There is no definite association with other general pathologic conditions.

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(2) Ann. Otol., Rhinol. and Laryngol., December, 1919.

True angiomas or nodular pseudo-angiomas, if small, can often be satisfactorily treated by fulguration, or the electric cautery. Radical operations, such as thyrotomy with or without the cautery, should never be done except when all other methods fail to relieve the distressing symptoms, or in cases of large angiomas in which the danger of hemorrhage from removal is great. The method of choice in treating all laryngeal angiomas is suspension laryngoscopy and inserting radium directly against the tumor. In case operation is decided on in patients with large angiomas, thyrotomy with or without the cautery is preferable. It insures the best exposure and danger from hemorrhage is reduced to the minimum.

Laryngeal Fibrotuberculoma. G. Portmann[3] was able to watch through several years the evolution of a fibrous tuberculous tumor in the larynx. It had been mistaken for cancer at first, and the larynx was exposed for laryngectomy. The tissues around were found infiltrated and thickened, so the proposed operation was abandoned, and the patient has been in fairly good health during the three years since he has been wearing a tracheal tube.

Tuberculosis of Larynx. Tuberculosis of the larynx is secondary to phthisis or tuberculosis of the lung, and while a small proportion of cases appear to occur primarily in the larynx, the early symptoms of pulmonary involvement and the extensive amount of lung tissue affected as shown by the *x*-ray findings has dissipated any notion that the affection is ever a beginning laryngeal condition. The evidence thus far is overwhelming in considering the lymphatics and blood-vessels responsible for the carrying of the bacilli to the larynx from the lung and setting up the process here as a secondary affection. H. Kunz[4] points out that whatever treatment is of benefit to the lung condition is also beneficial to the laryngeal involvement, and in this connection climatic treatment ranks first in importance in the early cases. High altitudes and residence in mountainous regions offer the best means for the cure of these cases. Even advanced cases are beneficially influenced by a sojourn

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(3) Presse. méd., Feb. 7, 1920.
(4) Laryngoscope, March, 1920.

in these high altitudes. Applications of caustic agents such as nitrate of silver, lactic acid, and galvano-cautery are all of secondary importance. In the advanced and hopeless cases opiates are usually required. Spraying the larynx with a 2 per cent. solution of cocaine before meal times may be necessary to enable the patient to swallow solid food if dysphagia is present. Extirpation of a portion of the larynx may become necessary when dyspnea is a pronounced symptom. As a rule, however, the patient succumbs to the pulmonary lesion before such a heroic measure has to be undertaken. Kunz reports three cases. Two of the patients are alive and well.

Phototherapy and Heliotherapy of Laryngeal Tuberculosis. Cases are cited by W. H. Barlow[6] to show that although heliotherapy and phototherapy are very valuable measures in the treatment of tuberculous laryngitis they are capable, if used unguardedly, of producing tuberculin reactions of indefinite severity and duration and therefore should not be used excepting under the guidance and control of a competent clinician.

In the treatment of the larynx the use of the 3.5-inch concave mirror on an area of 0.5-inch in diameter means a concentration of forty-nine times that of direct sunlight, and as the tubercles lie directly under or in the mucous membrane without the protection of the various layers of skin, fascia, etc., which overlie joint lesions, it is evident that a destruction of the bacilli in the lesions can take place very rapidly. A few tubercles in the interarytenoid space may easily contain several milligrams of tubercle bacilli. The destruction *in situ* of even a portion of these would be equivalent to the injection under the mucous membrane of the larynx of an enormous dose of tuberculin B. E.

In the past six months Barlow has used heliotherapy alone and combined with other agents in about seventy cases of tuberculous laryngitis, many of which are still under treatment. At present he does not feel justified in discussing the treatment further than to state that it is one of the most potent remedies in tuberculosis of the larynx. In fact, the potency of concentrated sunlight is so great that it seems not inappropriate to sound

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(6) Jour. Missouri State Med. Ass'n., January, 1920.

a warning as to the unguarded use of heliotherapy without considering the condition of the patient and the clinical course under treatment.

Soon after beginning the use of sunlight it was noticed that either a single prolonged exposure or a series of frequently repeated mild exposures was occasionally followed by a hyperemia, swelling, or even edema, and sense of dryness, discomfort, or even pain in the larynx. These symptoms did not correspond to the treated area but were limited to the lesions and to their immediate vicinity and therefore were not burns. In these cases there were usually constitutional symptoms of increased temperature and pulse, chills, malaise, slight headache, etc. Occasionally an increase of moisture in the pulmonary lesion was noticed. In other words, under certain conditions, the treatment produced all the signs and symptoms of a tuberculin reaction, local, general, and focal. But while the reaction following the injection of a moderate dose of tuberculin is of slight degree and usually disappears in from twenty-four to forty-eight hours, the reaction following indeterminate dosage produced by sunlight is naturally variable, both in severity and duration.

Operative Treatment of Tuberculosis of Larynx. Thomas Rüedi[7] has treated at Davos, Switzerland, 575 cases of laryngeal tuberculosis. On these 575 patients 1,548 operations were performed. In sixty-one cases curetting only was performed, in 168 both curetting and cauterization, and in the remaining 1,319 the electrocautery alone was employed. In every instance the laryngeal tuberculosis accompanied pulmonary tuberculosis, it being usually a case of stationary pulmonary tuberculosis (of the third degree, according to Turban-Gerhardt's classification) and of tuberculous laryngitis brought by the patient with him to Davos. In thirty-nine cases the pulmonary tuberculosis was clinically demonstrable by the lung specialist as unilateral only (in twenty-five cases on the right and in fourteen on the left). Of the twenty-five right-sided patients it was found that in five only the right side of the larynx, and in four only the left was affected. Of the fourteen

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(7) Brit. Med. Jour., June 21, 1919.

patients whose pulmonary tuberculosis was left-sided it was found that in two only the right and in one only the left side of the larynx was affected. This agrees with the observations of Besold and Gidionsen and others, and argues against homolaterality of pulmonary and laryngeal tuberculosis.

In 259 cases the laryngitis was not serious—that is, it was limited to a simple and circumscribed focus, and was in a stationary condition; in 265 cases it was of medium gravity—there were multiple but limited foci without tendency to rapid progression; in fifty-nine cases it was grave—with diffuse foci and rapid progression and caseation.

The tuberculous lesions were situated most usually on the vocal cords, less frequently on the arytenoids, and less often still on the epiglottis. The proportion of closed infiltrations to that of open lesions (ulcerated) was 1 to 5.

The patients were submitted to operation for their laryngeal lesions only after their general condition had been improved by fairly long fresh-air treatment. In the case of a certain number of them conservative treatment by means of painting with caustics or anesthetics or by heliotherapy was employed beforehand. It was only after the non-success of these measures that resort was had to operation.

The operation was now and then followed by a recrudescence of the pulmonary tuberculosis, especially in cases in which activity of the latter could be established beforehand. Accordingly, the conclusion reached was that operation for tuberculous laryngitis should be undertaken only in patients in whom the pulmonary tuberculosis is stationary, whose general condition is good, and who are free from fever, exception being made in the case of patients suffering from obstinate cough or from dysphagia. Several patients, however, were operated on notwithstanding fever and progressive pulmonary tuberculosis, and with a rather favorable result not only on the laryngeal but also on the pulmonary lesion.

The operative method which gave the best results was that of electro-cauterization according to the method of Mermod and Siebenmann with its abundantly destructive action. The sharp-pointed cautery, used deeply, was employed in cases of diffuse closed infiltration (edematous perichondritis), but its moderate effect is far from being equal to that of the Mermod-Siebenmann method.

Tracheotomy for postoperative stenosis was never necessary. Hemorrhage following the operation was observed twice, in one of the cases ten days afterward. On the other hand, frequently the laryngeal operation had to be postponed on account of hemorrhage which set in beforehand.

Operative treatment resulted in cure in a little more than a third of the number of cases followed and checked. The best results (52 per cent. of cures) were obtained in the electro-cauterization of the cords.

The 387 cases whose progress could be followed, may be classified as follows:

Laryngeal Tuberculosis.	Not Improved, or Little Improved.	Moderately Improved.	On the Way to Cure.	Cured*
First stage.....	8	46	37	89
Second stage...	42	89	13	48
Third stage....	13	0	0	2
Total......	63	135	50	139

* That is, from three months to five years after operation.

Laryngeal Bouginage. It is extremely difficult to cure chronic retained tracheal cannula cases. Laryngostomy has always been the operation selected and heretofore has offered the best results. Some less radical treatment than laryngostomy, which requires an endless amount of after-care and which is not always followed by satisfactory results, seemed desirable to H. L. Lynah.[8] After laryngostomy, the voice is never so good

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(8) N. Y. Med. Jour., Nov. 22, 1919.

as it is after gradual dilatation by the author's method —laryngeal bouginage. A small olive-tipped bougie should be passed from above through the endoscope avoiding a false passage into the tissues of the neck, or an injury into the esophagus. The first size or smallest bougie is placed against the stricture. If the small bougie does not pass readily forcible dilatation should not be attempted. After five minutes the trial should be discontinued and a second attempt made a day or so later. Usually after the third or fourth trial the small olive will pass through the tightest stricture.

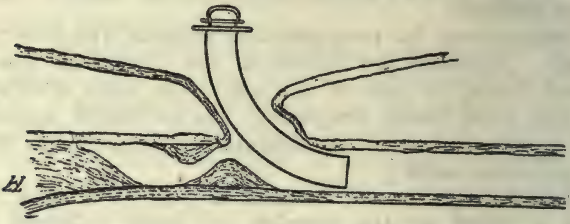

Fig. 39. Schematic sketch to illustrate the changes which occur in the larynx and trachea when an over-size tracheal cannula is used. Note the anterior and posterior spur formations at the bend of the cannula, and the complete closure of the larnyx above.

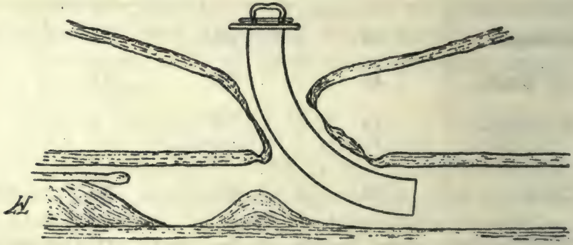

Fig. 40. Schema showing the properly fitting under-size tracheal cannula which should be used in all cases. The over-size cannula has been removed, a smaller one taking its place. Note the introduction of the small endolaryngeal bougie passed through the laryngeal stricture from above.

Lynah cautions that forcible attempts should never be employed with a larger bougie until the smaller size has been passed with ease several times. When this occurs a larger and larger bougie may be used, but never more than three sizes at any single sitting. After endoscopic bouginage is successful, dilatation from below upward may be attempted.

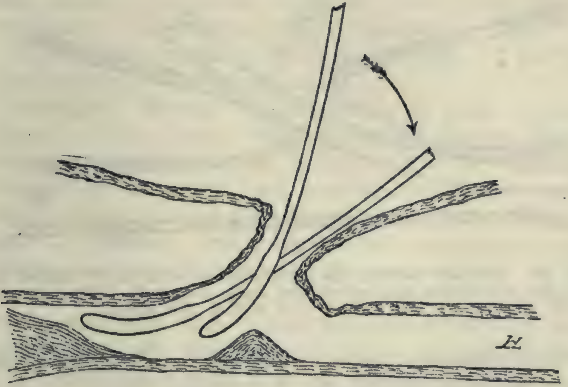

Fig. 41. Schematic illustration of retrograde bouginage. The bougie is introduced into the tracheal fistula almost perpendicularly, the curved being used to lift the upper anterior tracheal wall for easy introduction. The anterior wall is the guide for all bouginage.

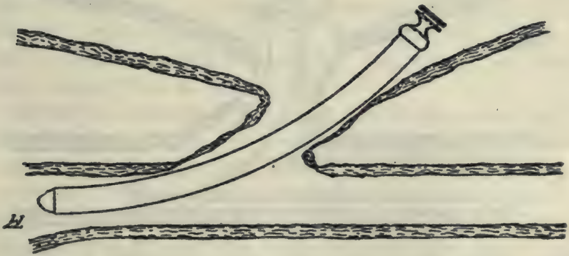

Fig. 42. Schematic illustration showing the introduction of the author's split cannula carrier with obturator, for the introduction of the soft rubber laryngeal tube.

Finally, before the author's split cannula carrier and the rubber laryngeal tube are inserted bouginage should be performed three or four times so that the larynx is thoroughly opened.

In treating these patients after the primary endoscopic introduction of a bougie, Lynah introduces his very fine cautery knife to cut the lumen of the web in its anteroposterior diameter, and follows this by gradual endoscopic and retrograde bouginage, finally introducing the laryngeal rubber tube. After galvanocauterization the burned edges of the web may adhere firmly if they are not separated by an intubation or rubber laryngeal tube for at least a week.

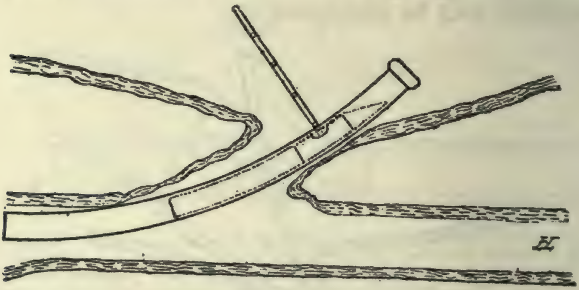

Fig. 43. Schema showing the introduction of the soft rubber laryngeal tube after the obturator has been removed. The cannula is removed as soon as the rubber tube enters the larynx.

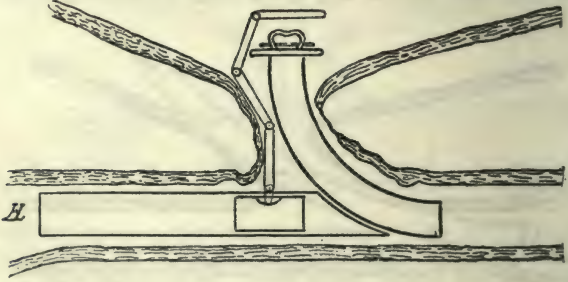

Fig. 44. Sketch showing the rubber laryngeal, dilating and drainage tube anchored in place. The tracheal tube has been reintroduced. Air easily passes through the laryngeal tube, and the child can be reeducated to mouth respiration.

Proper fitting tracheal cannulae should never occupy more than half the lumen of the trachea. It is unnecessary to have an enormous lumen; the small size tubes are sufficient. If there has been an extensive cicatricial contraction at the cricoid level, tracheotomy will not prove successful in the cure of laryngeal stenosis. The contraction must be dilated gradually by bougies. By this means Lynah has obtained gratifying results and ultimate decannulation of the patients.

The accompanying illustrations (Figs. 39 to 44) show the technique of the procedure.

Gunshot Wound of Larynx. A case of gunshot wound of the larynx with impacted foreign body with recovery of the patient is cited by J. W. Wood.[9] The wound of entrance had healed, but there was some emphysema around the wound, complete loss of voice, and a marked inspiratory and expiratory stridor. Laryngoscopic examination showed swelling of the left ventricular band, obscuring a view of the left vocal cord; swelling and edema of left arytenoid and ary-epiglottic fold, partially closing the glottic aperture. The right vocal cord was represented by a grey sloughy band, injured by the projectile on its passage across the larynx from right to left. The left side of the larynx was immobile and the movement of the right cord was limited. A Roentgen-ray examination revealed the presence of a metallic foreign body in the region of the left crico-arytenoid articulation. The foreign body was removed through a thyrotomy or laryngofissure under rectal anesthesia.

Steel in Larynx. While at work in a steel mill shearing tie-plate bars, a fragment of the steel tie-plate flew and struck the patient whose case is cited by F. Allport and B. Wilson,[1] on the neck below the point of the chin. He was taken to a hospital where the wound was sutured, and he was treated for about ten days and then returned to work. He could not talk above a coarse rough whisper.

A slight prominence, somewhat conical in shape, at the left lower aspect of the thyroid cartilage of the larynx, was somewhat adherent to the overlying skin,

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(9) Lancet, Jan. 3, 1920.
(1) Jour. Amer. Med. Ass'n., May 3, 1919.

and felt solid to the touch and moved with the larynx. Indirect laryngoscopy revealed an immobility of the left vocal cord, and the whole larynx was moderately inflamed. A roentgenogram disclosed a piece of metal about 1¼ inches in length extending anteroposteriorly and apparently through the left thyroid cartilage of the larynx.

Under procain local anesthesia an incision was made over the prominence spoken of above. Immediately after going through the skin and subcutaneous tissue, the scalpel came in contact with a hard metallic substance. By careful dissection, the end of the piece of steel was exposed and grasped with tissue forceps. The anterior end of the steel was freed from a few fibrous attachments by means of a small periosteal elevator, and the steel was gently and easily withdrawn. There was, fortunately, no hemorrhage or other undesirable complications. The incision was closed by one silk suture. The man was placed in bed under a steam tent and carefully watched throughout the next twelve hours and was not allowed to talk. During that time he had had no troublesome symptoms whatever.

He left the hospital in two days, and at the end of a week his voice was a little rough but almost normal. Since then the roughness has disappeared. An examination by indirect laryngoscopy, the vocal cords are normal in appearance and the left cord again moves normally.

Suspension Laryngoscopy. Experience has convinced R. C. Lynch[2] that the pedunculated fibromata which are said to spring from the vocal cord do in reality grow from its under surface and in most instances the actual point of attachment is the area just below the vocal cord or in the subglottic space. Complete removal can only be done under suspension, as the usual biting forceps can not be made to grasp the pedicle close to its attachment unless the cord is first held aside by some retraction, this requiring two hands. In the multiple papillomata of children, Lynch's success with the dissection is not so flattering now as with his first series of cases, but while he is unable to bring

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(2) Jour. Tennessee State Med. Ass'n., July, 1919.

about a cure with one sitting as first reported, he has yet to report his first failure to cure the lesion. Some patients come for re-operation and some repeatedly, in one, twenty-nine times in all, but even this boy has a voice of good tone and is breathing through a larynx in which no vestige of the tumor mass is to be found.

Lesions of the arytenoid area and the folds are frequent and yield readily to this technique. Cysts are dissected completely, raw surfaces are brought together by stitches, tags are removed, malignancies are destroyed by cautery. Foreign bodies, especially the impacted type, are easily removed with both hands free to work, and this without traumatism.

Finally, by the aid of suspension, the bronchoscope and esophagoscope can be passed into their respective passageways with far more accuracy and greater ease than by any other plan thus far adopted.

Total Laryngectomy. The condition of four people, three men and one woman, who have lived in comfort and happiness, and done useful work for 8, 12, 15½ and 22 years, respectively after total laryngectomy is reported by C. Symonds.[3] One—the woman—has died of old age, and hers was the most extensive of all the operations. In this case, a woman, aged 54, the entire larynx, together with a wide area of the pharynx, both lobes of the thyroid gland, with underlying lymphatics, were removed. Thyroid extract kept her free from the evil effects of hypothyroidism. Twenty-two years after operation she was able to converse with her family and friends without any effort.

In the second case the disease involved the muscles, and therefore complete removal was decided on. The left lobe and the thyroid gland, together with subjacent lymphatics and parts of the infiltrated muscles, were removed in July, 1904. The wound healed rapidly without the escape of any saliva. This man, now aged 67, is an assessor and collector of taxes. He can make people hear and understand without the speaking-tube, which is necessary, however, when there is much noise or where others are deaf, or, again, when he attends a

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(3) **Lancet, March 20, 1920.**

business meeting. It is now fifteen and a half years since the operation.

In the third case, several tracheotomies had been performed for recurrences before Symonds removed the entire larynx, together with the lobe of the thyroid gland and subjacent lymphatics. Healing was by primary union. A year later a recurrence taking place in the lymphatics on the left side. Symonds removed parts of the laryngeal and sternomastoid muscles, and the internal jugular vein together with the lymphatic track down to the clavicle. From this operation the patient recovered rapidly. It is now eight years since the laryngectomy.

In the fourth case, the thyroid was split and the growth removed in 1907. Recurrence ensuing complete laryngectomy was performed in 1908. It is now twelve years since the laryngectomy and no sign of recurrence.

The speaking tube used by Symonds may be described as follows:

The tracheal tube is of large size, slightly conical, and fits the trachea closely; it has no inner tube. It is inserted as soon as the trachea is brought forward at the operation. Fitting into this is the special apparatus for speaking, which has a flap-valve admitting air on inspiration. This valve closes on expiration, the air passing through a tube attached to the upper surface and thence into a rubber tube, by which the stream of air is carried to the lips. A vulcanite piece fits into the distal end of the rubber tube, the end of which is flattened and the orifice narrowed so as to deliver a broad and forcible stream of air. The exit tube, to which the rubber is attached, should have as wide a diameter as possible, and should be a good inch from the shield so as to carry the rubber clear of the chin.

This is the simplest form of apparatus in use, and enables patients to speak clearly under almost all conditions.

Influenza and Its Relation to Septic Laryngitis. The case reported by C. H. Long[4] commenced as an influenza, presented symptoms of a "cross infection," spreading

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(4) Illinois Med. Jour., February, 1920.

from one structure to another, ever increasing in virulence until on reaching the larynx it nearly terminated the patient's existence by suffocation—the septic condition being so severe.

The history of this case would seem to indicate a simple bacterial infection of the pneumococcus species, which succeeded or accompanied the attack in the nose of the influenza organism; then, slowly extending to adjacent parts, it developed symptoms more or less serious until finally it reached the larynx, having by its devitalizing process so diminished the power of resistance that it induced a severe septic infiltration. The rapid abatement of all symptoms, and the patient's rapid recovery with no other treatment but rest in bed and good nursing, is characteristic of septic laryngitis, if dissolution has not already occurred. It matters little what organism is present as they all produce the same kind of inflammation in the larynx, and the gravest results may seem impending, when quick retrogressive changes may occur. On the other hand, sudden suffocation may appear and unless instant relief is at hand, in the way of intubation or tracheotomy, death will result.

Tracheotomy for Edema of Larynx Complicating Influenza. Five days after the onset of influenza E. D. Smith's[5] patient, had the first symptoms of laryngeal obstruction. He had moderate dyspnea combined with suppressed husky articulation, and on two or three occasions had become cyanotic. There was no cough, the neck was moderately swollen in the upper part but yielded on palpation and showed no evidence of Ludwig's angina. Distal examination revealed a swollen epiglottis. Laryngoscopic examination was not made.

A low tracheotomy, both to get below the edematous area and to prevent a disfiguring scar above the collar line, was done at once under local anesthesia. The trachea was fixed by tenaculum and two cartilage rings cut with knife; the tracheal opening was dilated and a middle-sized tube slipped into place. The tube was fixed by tapes and covered with moist dressing.

The patient inhaled deeply through the tube, and his

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(5) Kentucky Med. Jour., July, 1919.

face became a healthy pink. He was returned to his room the atmosphere of which was kept moist with creosote vapor to lessen the bronchial irritation. On the third day following operation his general appearance was very good, respiration free, and swelling practically subsided. On the fifth day the tube was removed and the patient made an uneventful recovery.

Edema of Larynx as Complication. D. H. Segui[6] discusses the possible primary causes of edema of the larynx, from syphilis, drinking scalding fluids, trauma, such as a kick in the neck in football, kidney disease, neurotic edema or laryngeal urticaria and iodide edema. The latter is more common than generally recognized, and is liable to cause fatal asphyxia if potassium iodide is given when the lumen of the larynx is already somewhat obstructed by pathologic infiltration. He warns expressly against iodides when there is the least tendency to edema. Whatever the cause, treatment should consist of absolute repose, opium and bromides to quiet the cough, very cold or very hot applications around the neck, and spraying of the larynx with a suprarenal-cocaine solution, in preparation for the tracheotomy which may become necessary. He advises the intercrico-thyroid operation as easy, rapid and harmless; only in case of chronic disease, with secondary edema, the tracheotomy had better be lower.

Traumatic Laryngeal Edema. A farmer, aged about 40, gave the history of having been kicked on the left side of the neck by a mule thirty-six hours before I. A. Lederman[7] saw him.

His condition was serious, he was breathing with great difficulty, he was cyanotic, there was a great deal of emphysema, the neck was so swollen that the chin-line was obliterated, the eyes were practically closed, the emphysema having extended upward on the face and also downward on the chest. He was taken to the hospital immediately and a low emergency tracheotomy performed with difficulty on account of the extensive emphysema.

The man's condition improved immediately after the

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(6) Rev. de med. y cirug., Oct. 25, 1919.
(7) Kentucky Med. Jour., April, 1920.

operation, and within twenty-four hours the emphysema had entirely disappeared. Examination at this time showed well-marked edema of the larynx, especially on the side corresponding to the injury. He evidently had a slight fracture of the larynx, although this was not disclosed during examination, which allowed air to escape into the tissues of the neck. The cause of the dyspnea was secondary edema of the larynx.

Tranquil Tracheotomy by Injecting Cocaine within Trachea. All commotion connected with the performance of a tracheotomy, StC. Thomson[8] says, can easily be avoided by the intratracheal injection of cocaine in the following way: An ordinary hypodermic syringe is charged with about 20 drops of a 2.5 per cent. solution of cocaine. As soon as ever the tracheal rings are laid bare the syringe is grasped, as one does a pen, with the forefinger about 1 inch from the extremity of the neeedle, and with this the windpipe is sharply stabbed between two rings. The middle, the ring and the little finger of the operator's right hand are resting on the neck, and

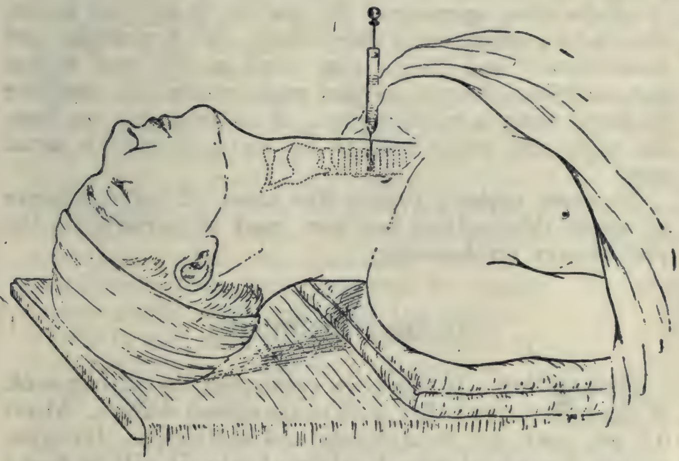

Fig. 45. Injection of cocaine within the lumen of the trachea.

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[8] Jour. Amer. Med. Ass'n., Oct. 4, 1919.

they prevent the point from penetrating more than one-fourth to one-half inch within the lumen of the trachea. The cocaine solution is injected into the cavity of the windpipe, from 5 to 15 drops, and the needle is sharply withdrawn (Fig. 45).

Thomson has used cocaine of the strength of 2.5 per cent. for the simple reason that a 5 per cent. solution is usually at hand, and it has been convenient to dilute it one half. In children, a 1 per cent. solution and 5 drops would be sufficient. The method is employed with either general or local anesthesia. Local anesthesia is sufficient in adults when opening of the trachea is the only operation to be performed at one sitting. With procain used endermically and the cocaine used in this way within the windpipe, there is neither pain, spasm nor coughing in performing a tracheotomy. A patient gets up from the table and walks back to his ward, to eat his usual meal.

Thomson records twenty-five cases of laryngofissure in which this method has been used in performing the preliminary tracheotomy.

SPEECH DEFECTS.

Stammering. It has been estimated that 3 per cent. of the population suffer with acute speech defects. About 0.9 per cent. are stammerers and stutterers. Irrespective of the primal case, F. Martin[1] says, it will be found that 90 per cent. of these patients have not their vocal organs fixed in the correct position for producing the sound which they are attempting to make. When the individual is made to give this sound correctly, breaking up the remainder of the word into its component parts, or phonograms, he sees that he can produce coördination of his vocal organs so as to give each sound in its proper sequence. In the beginning, the process is slow and conscious, but very soon fear of speech itself is dispelled, confidence restored, and a new subconscious control of the organs instituted—all of which makes for perfect speech.

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(1) Med. Record, May 29, 1920.

Great care must be exercised to see that the stammerer always opens his mouth quickly for the vowel following an initial consonant. Exercises containing letters with which the patient has special difficulty or the most fear, should be practiced silently, with mirrors, before actual vocalization; thereby focusing the attention on direct control of the muscles employed.

In treatment Martin uses a series of vocal gymnastics which he has carefully developed. The faithful practice of these exercises will not only intensify the auditory images of the stammerer, thus correcting temporary forgetfulness of the sound of the vowels, but will develop stronger vocal cords, producing a new voice and giving a freer control. This will destroy over-innervation or the straining to produce voice.

The correction of an acute case may require the proper training of the emotions to gain self control and relaxation. Relaxation, however, is only efficacious when it can be applied to speech. The rehabilitation of the mental attitude will alleviate the suffering occasioned by stammering. If the fear of the defect and the consequent secondary causes are removed, the relaxation will be complete and less effort required for speech. The stammerer needs more rest than the normal person. His efforts to talk are a greater drain on his vitality and the best therapeutic measure in all cases of fatigue is rest.

Hysterical Idioglossia in a Soldier. A case is cited by C. H. Ripman[3] which demonstrates a condition of acquired idioglossia, apparently hysterical occurring in an individual who had previously spoken normally. There seems to be only one other case on record. Private W. W., aged 42, a navvy in civil life, stood fire quite well until December, 1916, when he was blown up in a mine. He remembers nothing for seven or eight days. On regaining consciousness he was mute. He gradually learned to speak, but apparently always with a defect of speech. He continued in this condition for two years. On admission to hospital he was depressed, quarrelsome, difficult to manage, slow and stupid, but he gradually improved, and though never very intelligent he was able to take part in the life of the ward. He was illiterate

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(3) **Seale Hayne Neurol. Studies, April, 1919.**

and could only just write his surname. The other patients taught him to read a little, and he had quite a good idea of music, and could hum and sing popular melodies without difficulty.

On admission he was extremely difficult to understand; when he spoke quite slowly it was, however, generally possible to make out what he said. Later, as a result of re-education he could pronounce almost any word correctly, if he gave his attention to the matter, and even apart from this, he was not always intelligible.

His pronunciation of different words was as follows:

God—Dod
Glad—Jag
Glory—Jory
Can—Tan
Stomach—Tomat
Crack—Tchack
Bake—Ba
Victory—Bikty
Elephant—Eventen

Uncle—Unker
Fools—Foos
Cloth—Troff
Sleep—Seep
Fancy—Fanny
Butter—Bukker
Stone—Sto
Relative—Reventi
Article—Artiber

It will be noticed that he was not consistent in his mispronunciation, as (1) most letters were mispronounced in some words and pronounced correctly in others; (2) there were no sounds he could not produce. It was further noticeable (3) he was inclined to be very slovenly over the terminal syllables or consonants in words; (4) he sometimes omitted mesial syllables; (5) he went very much to grief over words with which he was not familiar; and (6) he also found great difficulty with words which were heavily loaded with consonants.

This defect of speech has been carefully studied by Guthrie, who believes that it is not very uncommon in children. The patients seem to speak a distinct language of their own, substituting alternative sounds for the consonants, but pronouncing the vowels correctly. In severe cases they are quite unintelligible, except perhaps to their little brothers and sisters, who often understand them, but slighter degrees are met with.

Guthrie came to the following conclusion as a result of his investigation in children.

It is not associated with weakness of intellect.

There is often a family history of insanity.

It is only an exaggerated form of minor and extremely common defects of speech.

It is probably due to congenital deficient appreciation of musical tone.

It is not associated with any malformation of the organs of speech.

[This condition is more common than is generally known. At the time of writing we have twenty such patients under treatment, ranging from 5 to 17 years of age, at the New York Clinic for Speech Defects. None of these patients ever had normal speech before treatment.—Ed.]

Stammering as a Disorder of Speech Dependent on Conditions of Child Development. Elmer L. Kenyon(5) says that stammering in most cases begins in early childhood, and should be considered as a perversion of the normal processes of speech development. This perversion of the normal speech processes is dependent on emotional disturbance arising from the necessity of developing the speech function under the trying conditions of social interrelations. Thus there are aroused in the child more or less profound manifestations of "social emotion." Behind this exciting cause often lie congenital foundation and environmental conditions, which tend to encourage the natural childish tendencies to excitability and emotionalism. Natural childish characteristics—impulsiveness, lack of self-control, relative absence of knowledge and reasoning, apprehensiveness—as well as the doubtful, wavering, clumsy, state of partial development of the speech function, both constitute factors which help to render the child susceptible to this manner of speech perversion.

The immediate psychology of the incitation to stammering involves (1) emotional excitement; (2) mental confusion, and (3) the impulsive effort to talk while in this uncertain state of mind. The result is a speech panic, in which normal control of the peripheral speech machine is for the moment lost. In the background of this immediate mental picture lie various disturbing phenomena which add to the mental confusion.

These beginning perversions of the speech act are often repeated; the mental stress behind them becomes a more or less constant status of mind. These mental and physical perversions play a baneful part in the general mental and physical physiologic processes of development. Thus the susceptibility to emotinalism and excitability slowly increase, both as to uncontrollableness and to intensity; and likewise the physical manifestations in the peripheral organs of speech.

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(5) Amer. Jour. Dis. Child., December, 1919.

This can not go on for months and years without having its influence in perverting the development of the character in general. The advanced stammerer has become a stammering person, rather than an entirely normal person who stammers. This fact renders the complete eradication of the disorder exceedingly difficult, and calls for the beginning of treatment at the earliest possible time, preferably at the very beginning of the manifestations.

Reduction and Reconstruction of Defectives in Hearing and Speech—Results in the United States Army. Major Charles W. Richardson[6] states that the average time required to make an efficient speech reader of the average deaf or nearly deaf soldier is two months. Interesting as it may seem very little difference was found in the degree of mental development with regard to ability to acquire speech reading. Of course those with the highest degree of mental intelligence made the most apt students, and acquired speech reading with the greatest rapidity.

Re-Education of the Voice After Operation for Intrinsic Cancer of the Larynx. Cortlandt Mac Mahon[7] states that the re-education of the voice, following operation for intrinsic cancer of the larynx, is carried out on simple and definite lines. The appearance and working condition of the larynx, after scar-tissue is established, are very similar to that which exists in cases of unilateral abductor paralysis of the cords. In all cases the vocal treatment consists in developing the sternothyroid and sternohyoid muscles so that the larynx is drawn down towards the sternum. This action brings about relaxa-

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(6) Trans. Sec. Laryngol., Otol. and Rhinol., of Amer. Med. Ass'n., 1919.
(7) Practitioner, May, 1919.

tion of the healthy cord; a deeper pitch is established and adduction made more complete.

When the larynx has been gotten under control, the increase in resonance in the voice is very definite, and then the resonator positions of the main, compound, and subordinate vowel sounds are taught so that the voice has its greatest amount of overtones and harmonies.

The practical suggestions that he offers for re-education of the voice in these cases are as follows:

Develop the sternothyroid and sternohyoid muscles, and keep the larynx low.

Make the patient speak as little as possible until a deep pitch of voice is established.

Let the breathing movement be inferior lateral costal, with a small but definite expansion, and let the motive power of the voice be the powerful contraction of the abdominal muscles.

When the larynx is established in its low position, instruct the patient that voice gets its chief resonance in the head and chest, and that the throat is a conduit pipe between them and must be entirely unrestricted, and also that free lip movement increases oral resonance. If further vocal treatment is necessary, the resonator positions of vowel sounds and clearness of articulation generally should be taught. He thinks it safe to say that a really useful voice can be anticipated in practically all cases.

War Neuroses of the Larynx and Speech Mechanism. H. Smurthwaite[8] had plenty of material for studying psychogenic cases in which the larynx and speech mechanism was involved. He states that the varieties one meets are:

1. The dumb, who are as a rule, listless, depressed, expressionless, some showing signs of nervous exhaustion in tremors generalized or confined to one or other limb, etc., others unable to walk or even stand erect, from chronic spasms.
2. The voiceless—speak in whisper of varying degree or in a falsetto or juvenile voice.
3. The stammerers and stutterers.
4. The malingerer.

Most of the patients treated were the voiceless. In

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(8) Jour. Laryngol., Rhinol. and Otol., January, 1919.

regard to laryngeal paralysis, as a general rule in patients unable to cough or speak we shall find some organic lesion, nerve or otherwise. On the other hand, if a patient is unable to phonate, but can nevertheless cough normally, we are dealing with some form of adductor paresis, and this condition is, as a rule functional.

In these functional cases, Smurthwaite finds there are four distinct recognizable variations in the position of the cords on attempted phonation:

1. Cords elliptical. Thyro-arytenoideus internus paresis.

2. Cords can be freely abducted, but there is no attempt at adduction; the cords lie more or less in cadaverie position.

3. Both true and false cords tightly pressed together; in fact, there is a spasm of adductor and constrictor muscles of larynx.

4. Cords approximate in anterior two-thirds, triangular space in posterior one-third-paresis of inter-arytenoideus. False cords meet in middle line due to air distension of ventricles from upward air-pressure, the exit being more or less blocked by resisting cords.

When there is no organic mischief to account for the loss of voice, and the patient can freely abduct the cords, but on attempting the vowel "a," pronounced "ah," brings the cords in any of these positions, we can be more or less certain the case is functional. Of course, there is always the possibility of early tuberculosis, causing myopathic paresis, and we have to exclude this. The best vowel for getting the initial musical sound is undoubtedly "a," pronounced "ah." It is the most natural, required the least effort, the position of the mouth, tongue, etc., being most favorable for a clear free note.

The treatment is dealt with under two headings: (1) moral, (2) physical.

Smurthwaite sums up the treatment as follows: Moral suasion, suggestion, deep breathing, forced expiration in the effort to get the first note out of the patient; then systematic vocal exercises to give the cords tone, and the patient confidence in his natural voice.

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